ECHNOLOGY DEPT

Telephone ENGINEER and MANAGEMENT

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AUGUST 1946

Featuring

TELECOMMUNICATIONS OF THE FUTURE

By E. Chisholm Thomson

•

Editorial on page 4

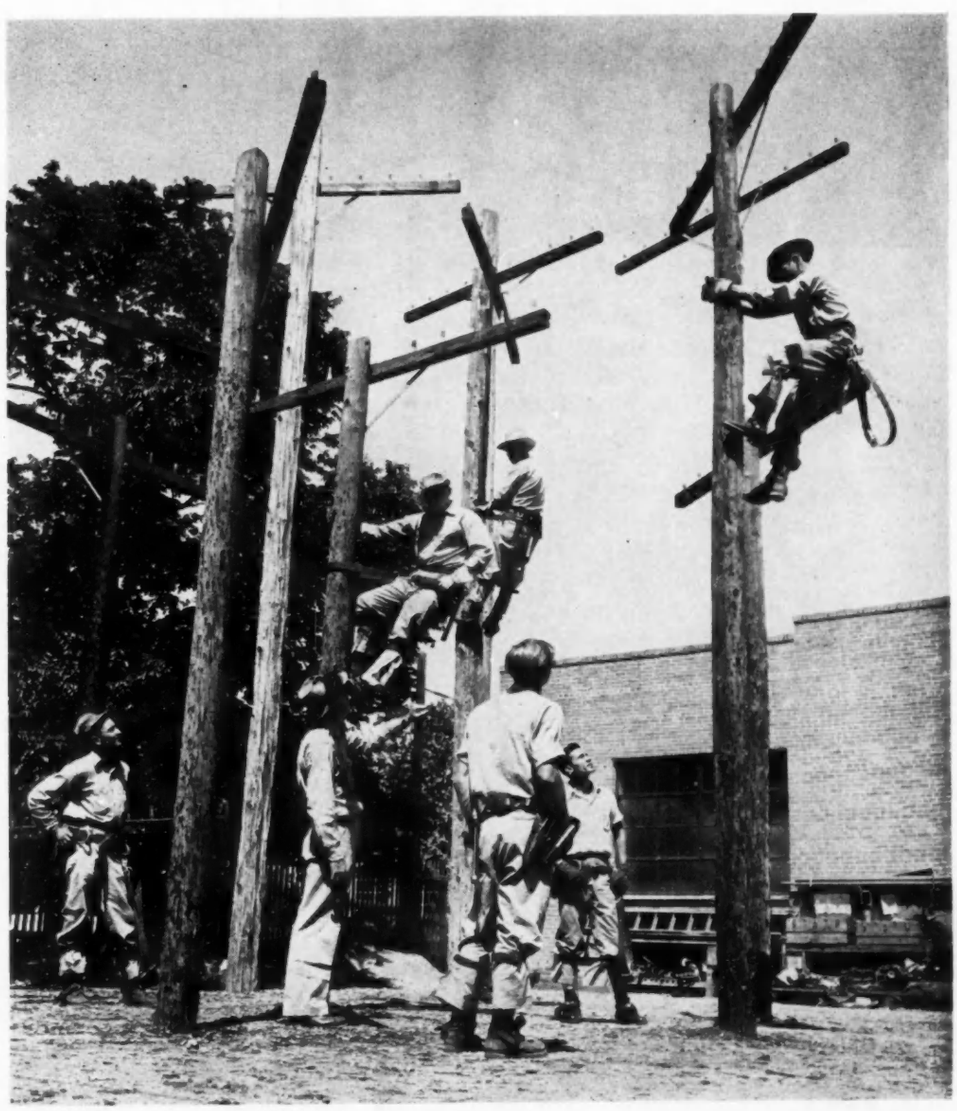
•

The Cover Picture—

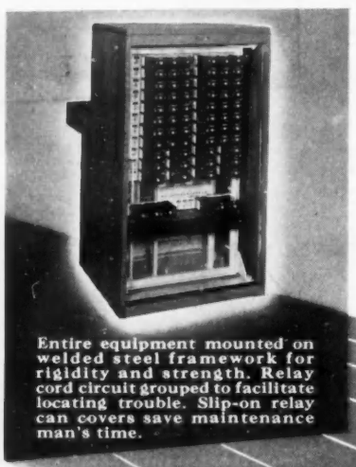
"The Correct Way to Climb a Pole . . ." es snapped by James F. Laughead of allas, Texas, and was loaned to us by outhwestern Telephone News, Southwest- n Bell Telephone Company, who also featured it in a recent issue.

•

ELEPHONE ENGINEER Publishing orporation, 7720 Sheridan Road, Chicago 26, Illinois



FOR EVERY INSTALLATION REQUIREMENT —



Entire equipment mounted on welded steel framework for rigidity and strength. Relay cord circuit grouped to facilitate locating trouble. Slip-on relay can covers save maintenance man's time.

Hinged relay gate makes all equipment easy to work on. Line terminal blocks are mounted on revolving bar, may be turned for greater ease in wiring and testing. Carefully fitted, tightly locking rear door lessens dust problem.

Black Bakelite face and keyshelf insures high visibility, neat appearance, long life and easy cleaning. Hinged keyshelf raises for easy access to key wiring. Cords and cord supervisory lamps are in color groups for speedier association of proper cord and supervisory light.

LEICH FLOOR TYPE PBX

The profit possibilities of a PBX switchboard installation are much better if the switchboard is exactly suited to the needs of the user.

Which is good reason for investigating these Leich floor type PBX's. For they are available in six standard circuit arrangements. Thus you can choose one that exactly suits every operating and service condition of your specific installation.

Whatever is necessary—through or blocked supervision, jack or plug-ended trunks, through dialing, automatic trunk holding, or predetermined busy circuit test for toll dialing—you can have it with a Leich floor type PBX.

What's more, in these boards you'll find the same sound engineering, honest good workmanship and quality material that is characteristic of all Leich equipment . . . and is your guarantee of a long and useful life with a minimum of maintenance.

Leich PBX switchboards are available in various capacities for connecting to manual or dial central offices. Write for the new PBX catalog, now being printed, which gives full details.

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NEW!
FLOOR TYPE PBX CATALOG

This new illustrated catalog contains complete specifications on Leich floor type PBX switchboards. It is now being printed. Fill out and mail the coupon for your copy.

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Please send me your new floor type PBX catalog as soon as it is off the press.

NAME

COMPANY

ADDRESS

CITY

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"It Seems to Us"

Plans have now been completed to bring you three big issues of the TELEPHONE ENGINEER publications this Fall. Our staff is now busy preparing the Fall Construction and New Products Number of this magazine for September. Our Convention Numbers will be Pre-Convention, October 1 Fortnightly, and Convention Report Number will appear 5 days after the convention in the October TELEPHONE ENGINEER & MANAGEMENT.

●

We learn from the Monitor, Mountain States Tel. and Tel. journal, of the teleconscious cat, who will summon her mistress whenever one long ring comes through on their line. The cat purrs during phone conversations, and even sleeps by the instrument.

●

Cook Electric Company, Chicago 14, Ill. have announced their catalog now available to all telephone people. Copy may be secured at no charge by writing the company direct addressing your letter to Department TC, or by writing the Editor.

●

D. H. Comparette, Jr. and Pam Grimstead of the Kerrville (Tex.) Telephone Co., are making arrangements for the board of directors meeting of the Texas Telephone Association to be held in Kerrville, September 21. Both business and hospitality will come from this combination.

●

R. W. (Bob) Hedrick, secretary of the Missouri Telephone Association, has just announced the date for their 1946 convention. November 18 and 19 at Hotel Governor, Jefferson City, has been selected. Bob and his association have just finished three district meetings held in Macon, Rolla and Springfield in mid-July.

●

A letter from William H. T. Cox, Director of Telephone & Telegraphs to the Imperial Ethiopian Government, Addis Abeba, Ethiopia, wrote for assistance recently. Most of the communications equipment there was damaged during the war period and they almost have to start over from scratch. We passed on to the manufacturers he selected his request for data, catalogs, etc.

●

The date June 20 continues to be important in the family of Garland B. Foscue whose family has been in Independent telephone business through 3 generations. It is the birthdate of Garland and also of his new grandson, Garland B., III born in June to Mr. and Mrs. G. B. Foscue, Jr. at Brownwood, Texas. Peculiarly enough the now senior Foscue's father had the birthdate of June 21.

Telephone ENGINEER and MANAGEMENT

THE NATIONAL TELEPHONE MAGAZINE

Volume 50 Number 8 Since 1909 August, 1946

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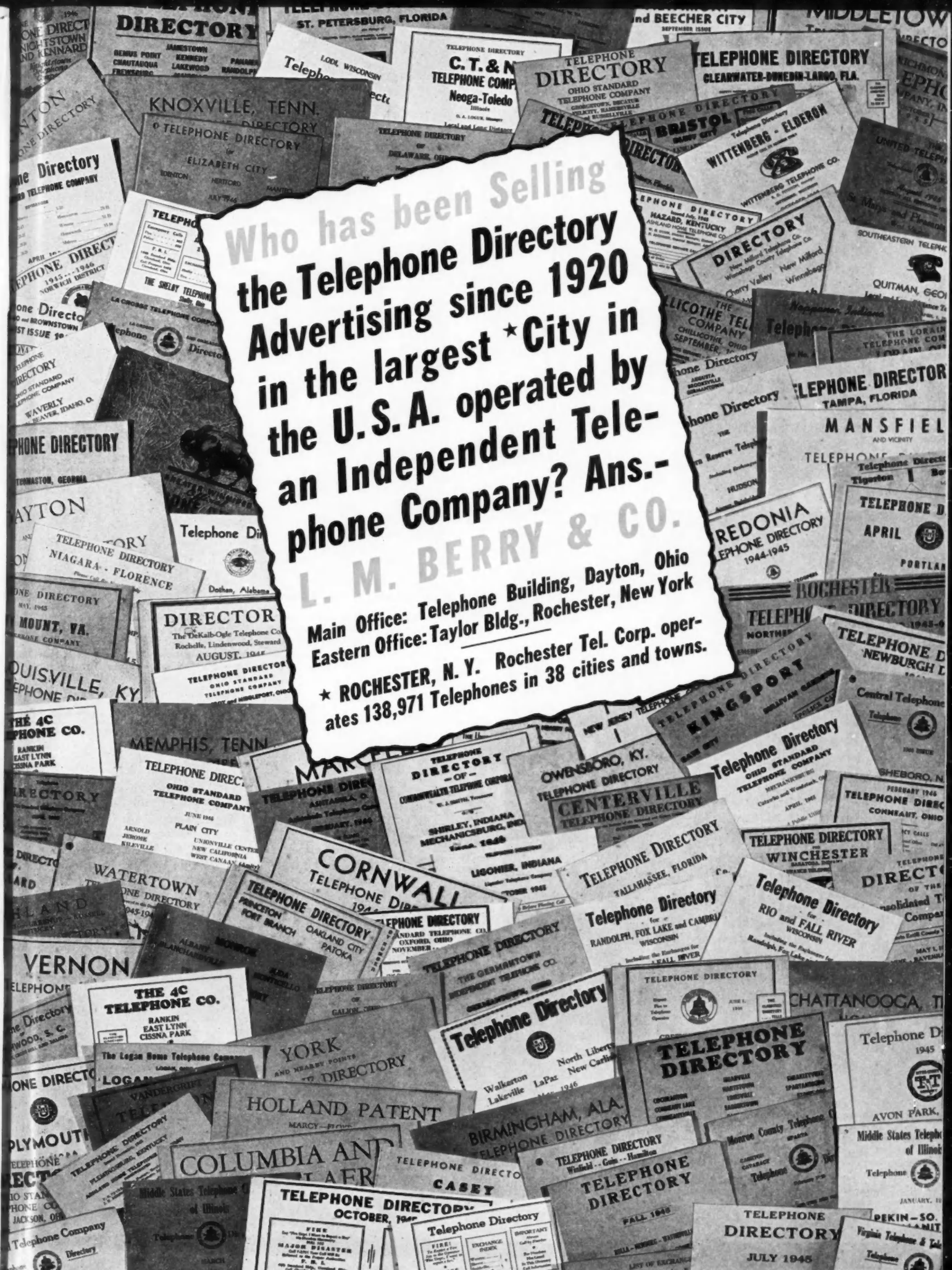
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the Telephone Directory
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in the largest ★City in
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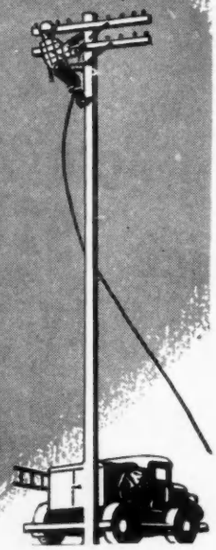
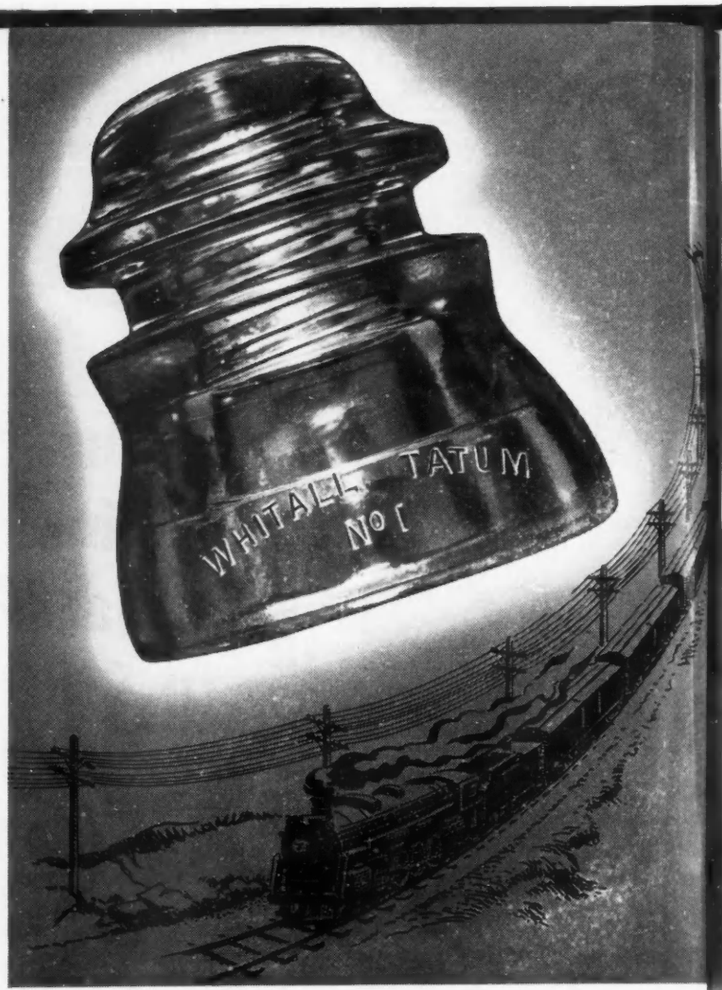
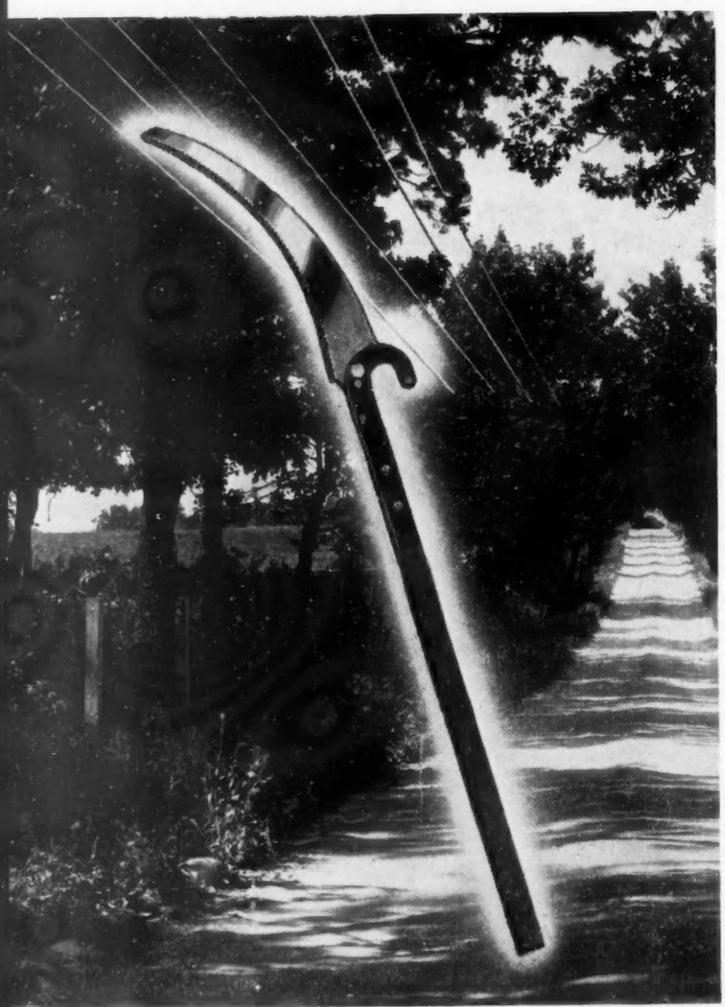




Meet Every Service Need. No matter what your requirements, there is a size and style of Armstrong's Whitall Tatum Insulator to meet it. Made by ARMSTRONG CORK COMPANY, they feature crystal clarity of glass, accurate gaging, and unusual resistance to temperature changes. For lower maintenance costs, use Armstrong's Whitall Tatum Insulators.



Smooth, Clean Cuts through toughest limbs are made quickly and easily with the Bartlett No. 44 Pole Pruning Saw. The tough, perfectly tempered steel blade is clearance ground to prevent binding while cutting green wood. The steel head which holds the blade has a built-in hook for dislodging cut limbs. Made by BARTLETT MANUFACTURING COMPANY in several pole lengths.

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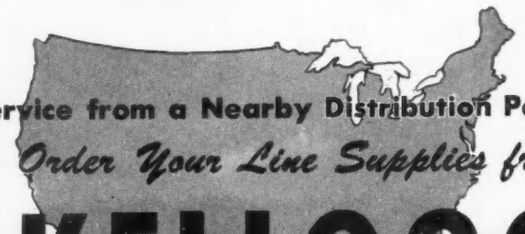

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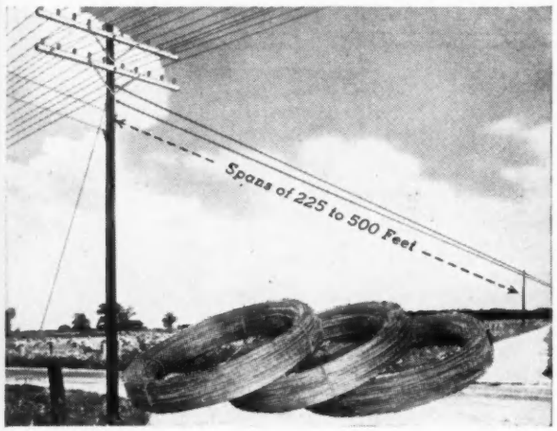
LINE UP WITH KELLOGG FOR LINE SUPPLIES.....DOUBL

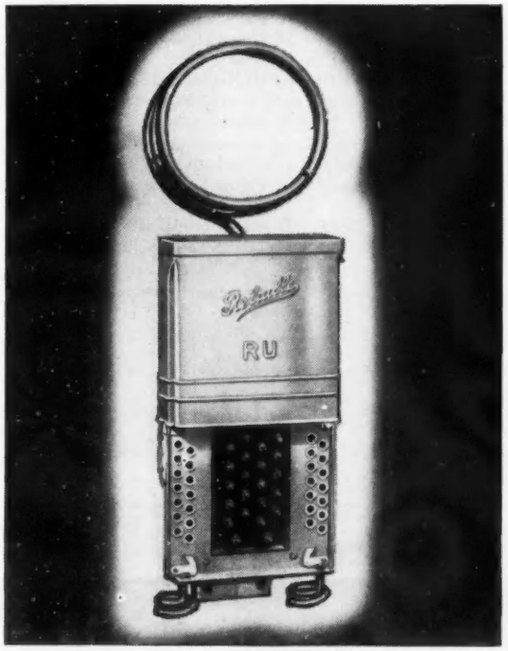
Not A Kink In A Carload. Kellogg Koiled Kords always stay out of the way and thus help reduce telephone breakage caused by dangling cords. The outer rubber cover is permanently molded in spiral shape, thus assuring natural, uniform retractability. An exclusive KELLOGG product.



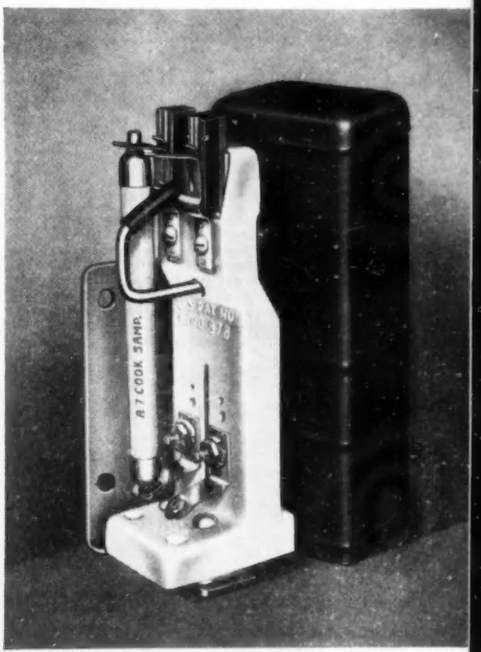
Save Three Ways . . . on materials, man-hours, and maintenance, with INDIANA STEEL & WIRE CO'S. Crapo HTL-85 and Crapo HTL-135 Line Wire. Galvanized by the famous Crapo Galvanizing Process, it's protected with a heavy, ductile, tightly-adherent coating of zinc.

More Lines, More Power. For the special needs of the Telephone Industry, in these days of service expansion, PHILCO provides the famous Floté Battery, in glass (illustrated), and in rubber and Vitrabloc jars. This basically different battery marks a major advance. It eliminates low cells in full float service . . . reduces maintenance . . . materially increases battery life.

Save Time, Labor and cut post-hole digging costs 75% with speedy, easy-to-use Ka-Mo Power Earth Boring Drills. Operate drill and motor from end of boom, or carry to any desired location. Electric drill is powered by portable gas-powered generator. Made by KA-MO TOOLS, INC.



Really Waterproof. The Reliable "RU" Reversible unprotected type Cable Terminal has earned wide acceptance throughout the telephone field. Made by RELIABLE ELECTRIC CO., its reversible sliding cover protects connections from weather and simplifies installation. Cast cable chamber will outlast the cable.



Built to "Take It!" The Cook Type "O" Sub-Station Protector, with grounded non-corrosive Everdur hood fitting tightly to sides and bottom, is ideal for both indoor and outdoor use. A product of COOK ELECTRIC CO., its body is low-absorbent porcelain, designed to prevent surface leakage.

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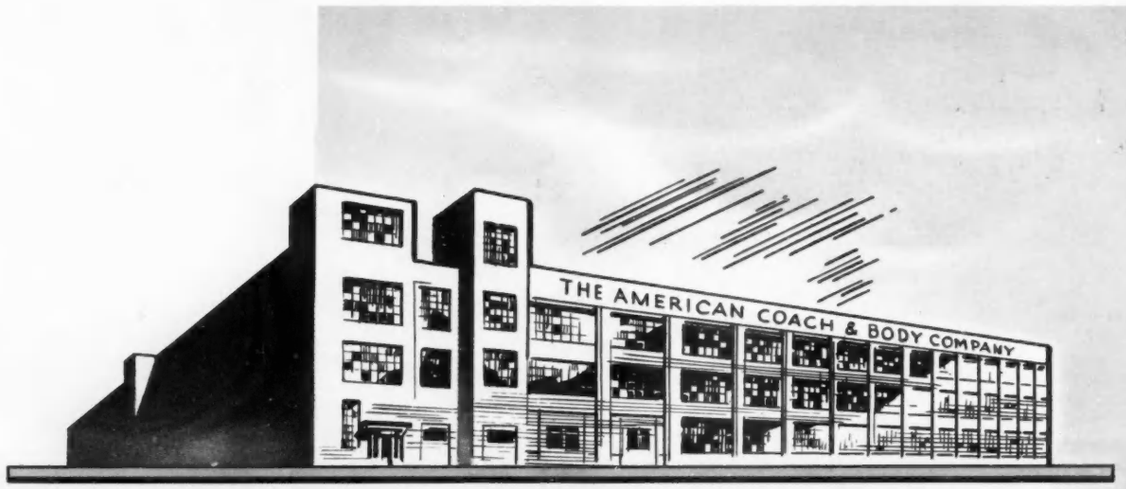


BETTER EQUIPMENT MAKES POSSIBLE BETTER STANDARDS of PUBLIC SERVICE

American's renowned "storeroom on wheels" has many standard features . . . Ask for the new bulletin, just off the press, on American's Line Construction Bodies . . . shows dimensions, sizes, equipment, features, and other useful data.

Another example of standardization . . . by incorporating crew compartment in body, American removes cab from the "special" to the standard class, offering ready resale on open market. Ask for new bulletin on the American B-4.

AFTER WORLD WAR I, America showed the world how mass production could lower the price of goods . . . place them within reach of millions and create a higher economic standard of living than any other people ever achieved.

This time, industry foresees another opportunity to progress still further in the development of high production at lower costs . . . *through the intelligent application of efficient standardization.*

In the utility field, American Coach translates standardization as a means of reducing distribution costs while improving the already high standards of service to the public. This company, as the largest manufacturer of utility bodies, will aid utilities to achieve the objectives by continuing to design and build standard "special" bodies.

Standardization is not new with us. American bodies are made of standard parts to permit easy maintenance and assembly line production. Gadgets and trick features purposely have been left out. To put "special bodies" in the standard class, as we have done, requires ample resources of facilities, personnel, engineering, and experience. *We have them.*

Equally important, many of our features have been developed and adopted at the suggestion and recommendation of the operators as a result of field experience in using this equipment.

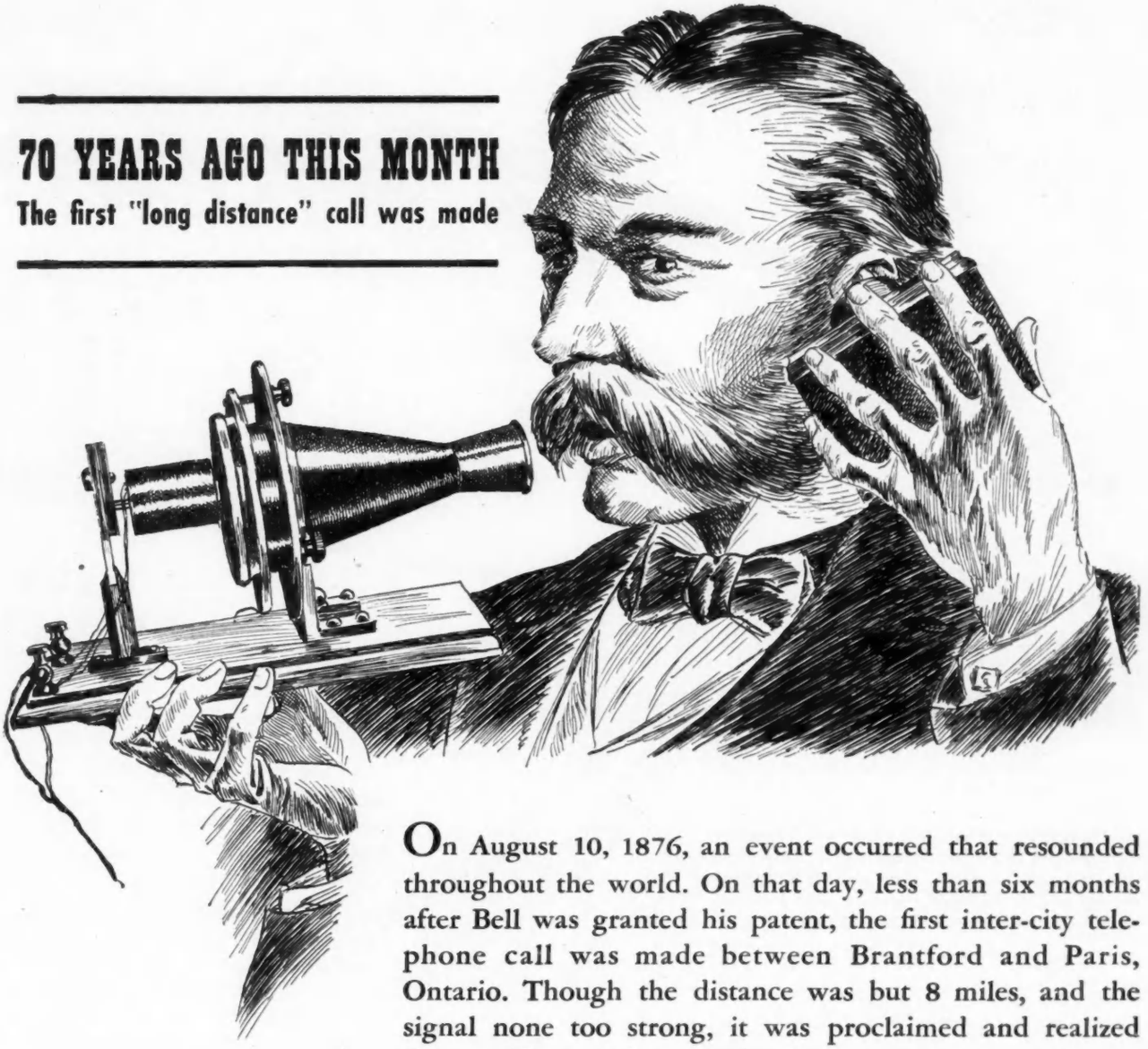
THE *American* COACH and BODY COMPANY

9503 WOODLAND AVE., CLEVELAND 4, OHIO

"Baker American" . Baker Equipment Engineering Co., Richmond, Va. . Sales and Assembly

70 YEARS AGO THIS MONTH

The first "long distance" call was made



On August 10, 1876, an event occurred that resounded throughout the world. On that day, less than six months after Bell was granted his patent, the first inter-city telephone call was made between Brantford and Paris, Ontario. Though the distance was but 8 miles, and the signal none too strong, it was proclaimed and realized the world over that telephonic progress was on its way . . . and moving fast.

"On its way and moving fast" has signified telephonic progress through each succeeding year. To start from scratch and accomplish so much within a single life-time is an achievement of which all telephone workers may well be proud. It is forceful evidence of the soundness of their tradition of faithfulness and dependability.

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BATTERIES

In Exide Batteries, used for many purposes by telephone and other communication companies, you will find the same dependability for which telephone service is famous throughout the world. Since 1895, Exides have been proving themselves worthy of that trust.

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Now Ready!

GENCATEL

Jacketed with PIGMENTED POL

What is PIGMENTED POLYETHYLENE?

Pigmented polyethylene, the insulation used on GENCATEL Drop Wire, is a resin-base plastic, electrically superior in every respect to any other extrudable wire insulation or jacket. It is unaffected by weather exposure, and is inherently tough over a tremendously wide temperature range. And because it is simply molded around the wire, it forms a solid, one-piece covering which is easy to handle and easy to strip.

Everything you've looked for in drop wire, you'll find in the new GENCATEL. Thanks to its jacket of pigmented polyethylene, GENCATEL Drop Wire withstands the hardships of use far better than any standard braided drop wire—and its insulation resistance remains far higher, throughout years of service.

Polyethylene insulation was developed before the war, as a "de luxe" jacketing for electric and communication wires. During the war, the armed services gave it many tough assignments, and under all conditions, from the arctic to the tropics, it established a remarkable record of performance.

Now it i
improved
and by
field, pi
CATEL,
drop wir
But let G
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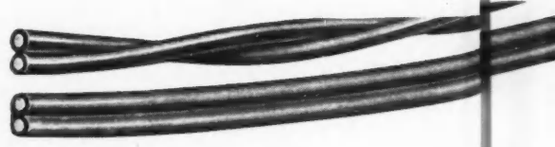
stubborn
for a sa
you'll los
drop wir
and with



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Compared with standard braided drop wire, GENCATEL provides:

INSULATION RESISTANCE — Considerable improvement.

ABRASION RESISTANCE—5 times as good.

WEATHER RESISTANCE—Decided improvement.

IMPACT AND CRUSHING—Twice as good.

COMPRESSION RESISTANCE—90 per cent improvement.

For You!

TELEPHONE DROP WIRE

POLYETHYLENE

Now it is back, and ready to serve you. Further improved, and thoroughly tested in the laboratory and by Independent telephone companies in the field, pigmented polyethylene is used on GENCATEL, to make this the very finest of telephone drop wires.

But let GENCATEL speak for itself! Twist it—pull it—"rough it up"—and you'll see for yourself how stubbornly GENCATEL resists harsh treatment. Send for a sample and complete data—TODAY—and you'll lose no more time in adopting this modern drop wire. It is available in parallel or twisted pair, and with copper, bronze or Copperweld conductors.

YOUR BEST BUY for years of service

The true cost of drop wire is its cost ***per year of service, installed.*** That's why GENCATEL is your best buy in drop wire. Numberless tests in the laboratory and in the field have shown that GENCATEL will outlast any other type of insulation now available for drop wires. Once up, it's up for years.

Install GENCATEL for all new drops and replacements, and you'll soon find your annual drop wire costs starting downward!

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The Calculagraph is the dependable instrument for recording starting time and elapsed time of toll calls. Accurate, simple in operation, the Calculagraph is especially helpful in times like these, when toll traffic is heavier than ever before. Telephone companies throughout the world know that Calculagraph, serving the industry 54 years, can be counted upon to supply the essential time data required for billing long distance calls.

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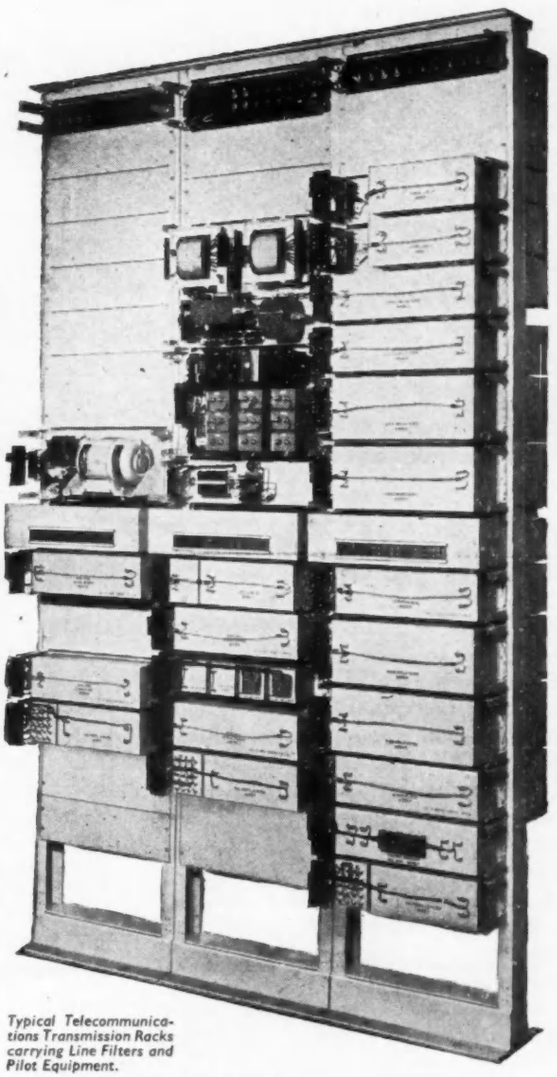
The facilities afforded by these systems are obtained with increased efficiency whilst effecting a substantial saving in line and cable construction and maintenance.

Consider, now, the application to your circumstances of—



Typical Telecommunications Transmission Racks carrying Line Filters and Pilot Equipment.

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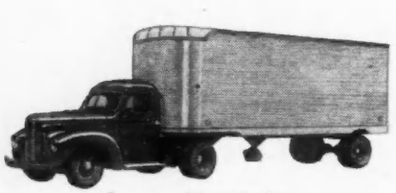

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THERE IS NO NEED OF CUTTING THE LINE TO MAKE THE CONNECTION—JUST SLIP THE SLEEVE OVER THE LINE WIRE AND COMPRESS

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12 BWG TO No. 17-18 DROP WIRE
Stock No. T2-109 x 045D

17-18 B&S TO 17-18 B&S
Stock No. T2-045B

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THE NATIONAL TELEPHONE SUPPLY COMPANY

Long span construction with U·S·S AMERTEL keeps costs low

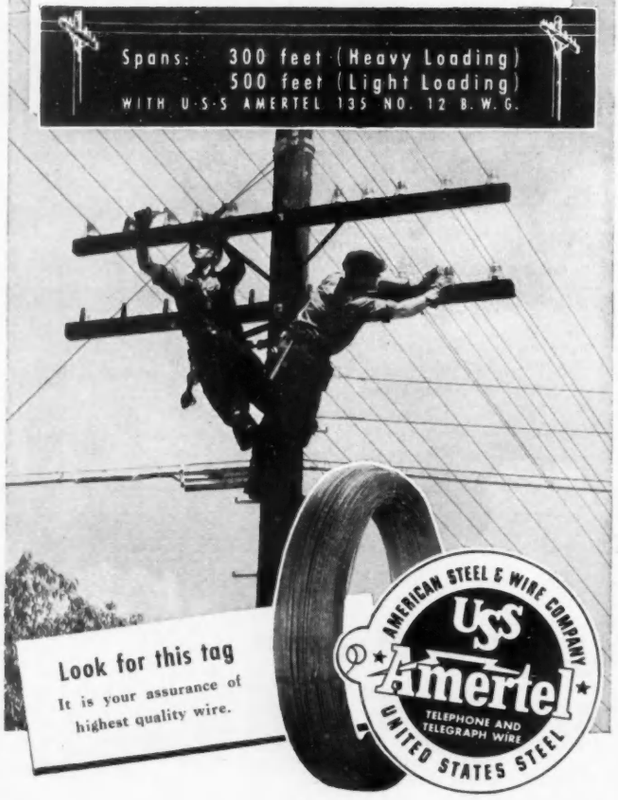
Longer Spans. With 2½ times the strength of Standard "BB" wire, Amertel 135 can be used in spans up to 350 feet in heavy loading districts, 450 feet in medium loading districts and 500 feet in light loading districts. This compares with 150 . . . 225 . . . 300 for "BB" wire in respective loading districts.

Low electrical resistance. At voice frequencies U·S·S Amertel 135 has approximately 20% less resistance than "BB" wire. This results in better transmission efficiency and lower losses.

Long Life. Galvanizing is applied to U·S·S Amertel 135 by the hot dip process which results in a perfect bond between the steel and the zinc with no definite cleavage surface. This means greater corrosion resistance and longer life.

Lower Costs. Greater strength, longer spans, fewer poles, less hardware and less maintenance all add up to lower construction costs and lower upkeep costs. You get fewer outages due to wind and sleet and better continuity of service.

American Steel & Wire Company
Cleveland, Chicago, New York
Columbia Steel Company, San Francisco,
Pacific Coast Distributors
Tennessee Coal, Iron & Railroad Company,
Birmingham, *Southern Distributors*
United States Steel Export Company, New York
UNITED STATES STEEL


Spans: 300 feet (Heavy Loading)
500 feet (Light Loading)
WITH U·S·S AMERTEL 135 NO. 12 B.W.G.
Look for this tag
It is your assurance of highest quality wire.
AMERICAN STEEL & WIRE COMPANY
USS
Amertel
TELEPHONE AND TELEGRAPH WIRE
UNITED STATES STEEL

Keep Your Bells Ringing with SUB-CYCLE

On the Job

You'll do it too because Sub-cycle is noted for its dependable service in producing a powerful ringing current—delivering years of trouble-free service. Sub-cycle has won the distinction of being the . . . .

CHOICE of the Telephone Industry

. . . and the Telephone Industry demands efficiency under the severest operating conditions. Sub-Cycle is successfully used by Railroads — Power Companies — Private Industry — Fire Alarm Systems — Telegraph Companies — Pipe Line Systems.

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LORAIN PRODUCTS CORPORATION
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NEALE MODEL "B"

Spinning is the finest method for suspending aerial cable . . . the only method which completely eliminates ring cutting, bowing and crystallization. Equally efficient on existing cable or new construction. One man can do a perfect spinning job . . . does not require truck, tractor or gang of men.

LASHING WIRE CLAMPS
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"LITTLE GIANT" SLACK PULLER
SPINNING WIRE

BUCKEYE
TELEPHONE & SUPPLY CO.
COLUMBUS 6, OHIO

NEOPRENE WINS
A TEN YEAR ENDURANCE TEST!

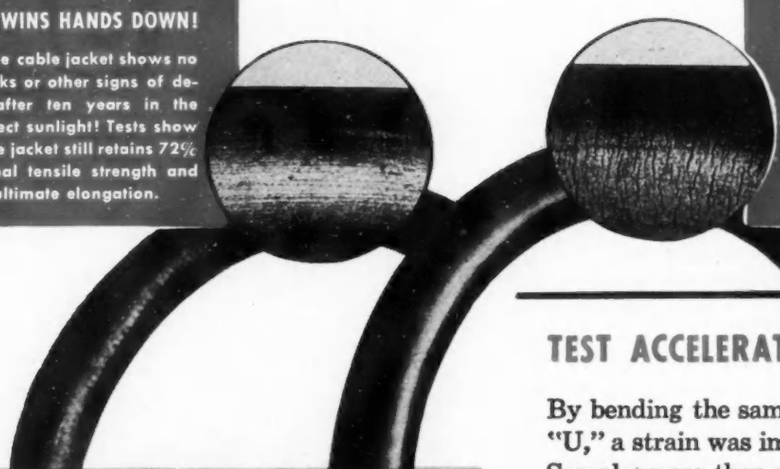
Cable jackets exposed to weather and sunlight in grueling test for durability

NEOPRENE WINS HANDS DOWN!

The neoprene cable jacket shows no surface cracks or other signs of deterioration after ten years in the open, in direct sunlight! Tests show the neoprene jacket still retains 72% of its original tensile strength and 85% of its ultimate elongation.

NATURAL RUBBER FAILS EARLY!

The photograph shows the natural rubber jacket cracked so extensively that it is unfit for service. After five years the cracks were so pronounced that it was impractical to test the rubber jacket for tensile strength and ultimate elongation.



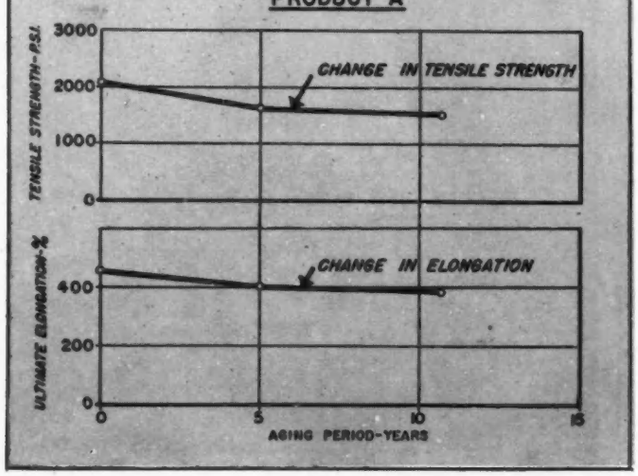
TEST ACCELERATED BY STRAIN!

By bending the samples in the form of a "U," a strain was imposed on the jacket. Samples were then placed outdoors fully exposed to the weather and direct sunlight for 10 years and 7 months.

LOOK TO NEOPRENE for better wire and cable jackets—and *wherever* you need a durable elastic material that is really resilient and is highly resistant to heat and flame, to sunlight and weathering, to abrasion and wear, to oil and grease, to acids and chemicals, to aging and oxidation, and to the action of ozone.

AN INTERESTING NOTE

The graph shows that neoprene's rate of change in physical properties gets smaller as the years go by—with the greatest rate of change in the first five years.



WRITE FOR *a free subscription to* The Neoprene Notebook. *Interesting stories of new or unusual neoprene applications — which may suggest new ideas to you!*

RUBBER CHEMICALS DIVISION
E. I. du Pont de Nemours & Co. (Inc.)
Wilmington 98, Delaware

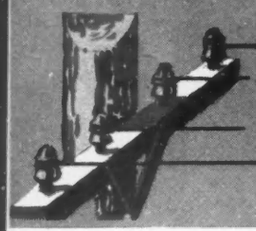
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

DU PONT
REG. U.S. PAT. OFF.

FOR BETTER WIRE AND CABLE, SPECIFY

DU PONT NEOPRENE

THE *VERSATILE* SYNTHETIC RUBBER



NEARLY TWO DECADES OF SERVICE

Time-Proved Adler Carrier

1ST

ADLER CARRIER SYSTEMS were First in:

Full A.C. operation of voice-repeaters, carrier terminals and carrier-repeaters.

Repairable line and band-pass filters.

Package equipment completely wired and assembled as a single unit at the factory.

Intermediate and "forked" channel-systems. This permits a set of multi-channel terminals to be split between various locations.

Permits addition of future channels on initial carrier system without disturbing the original equipment.

Auto-transformers with five variable ratios (for impedance-matching of cable to open-wire lines).

Improved balancing-units.

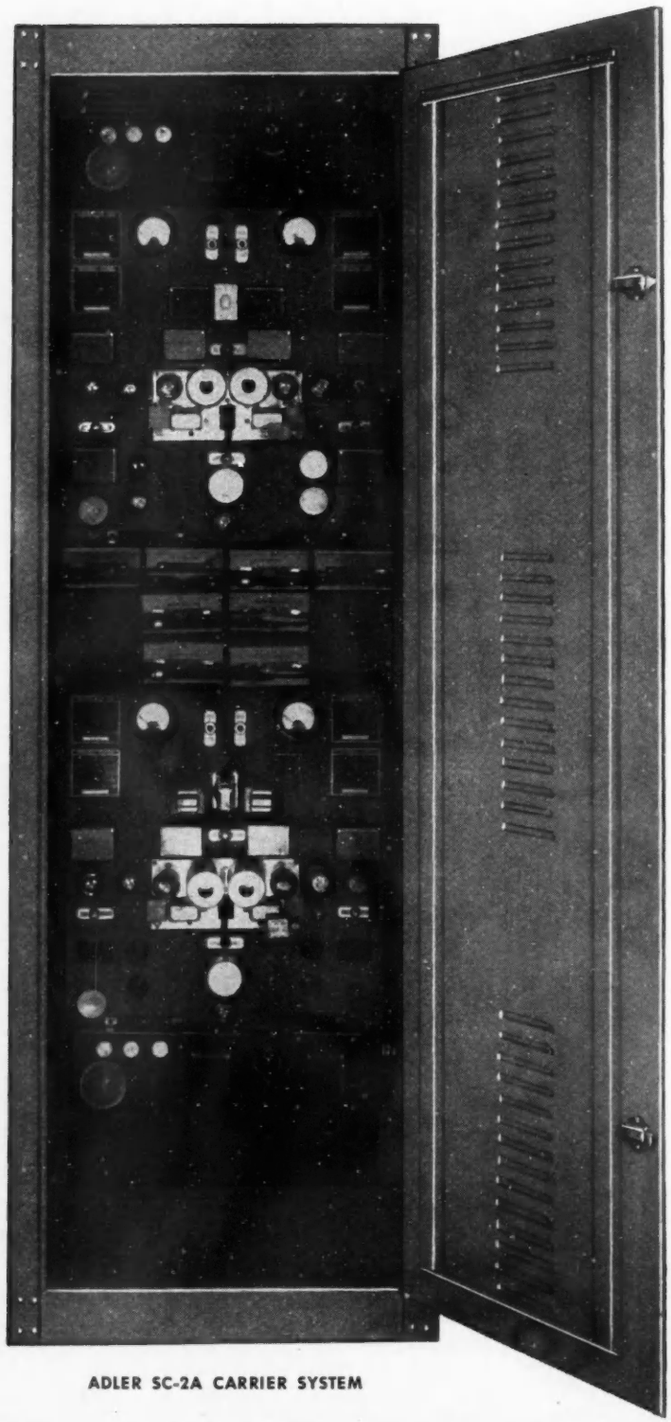
A simplified carrier-signal circuit employing but three relays instead of the usual eight to thirteen, also no twenty-cycle mixing is required.

Simplified controls can be operated by anyone.

Scientifically evolved methods of coil-impregnation, making them impervious to salt air, humidity, etc.

ADLER CARRIER SYSTEMS EMPLOY THE FOLLOWING FREQUENCIES:

Type SC-1A Terminals: Single Channel	7 kc East or North Bound 10.5 kc West or South Bound
Type SC-2A Terminals: Second Channel when used with Type SC-1A	21 kc East or North Bound 14 kc West or South Bound
Type SC-3A Terminals: Channel No. 1:	24.4 kc East or North Bound 15.9 kc West or South Bound
Channel No. 2:	20.7 kc East or North Bound 12.4 kc West or South Bound
Channel No. 3:	28.5 kc East or North Bound 9.3 kc West or South Bound



ADLER SC-2A CARRIER SYSTEM

CE BACK ADLER CARRIER EQUIPMENT

er

Systems NOW OFFERED to the Independent Telephone Companies By STROMBERG-CARLSON

Stromberg-Carlson now offers independent telephone operating companies the time-proven Adler Systems of Carrier Equipment.

While comparatively new to most of the telephone field, Adler Systems have been in use for eighteen years by private wire, railroad, and pipe line companies.

Completely wired and assembled as mobile or rack mounted units, the Adler Systems reduce field installation to an absolute minimum. Adler Systems are low in initial, operating, and maintenance costs.

If you are interested in increasing toll or trunk line capacities, write today for your free copy of an eight-page booklet giving complete details of these Carrier Telephone Systems now being offered by Stromberg-Carlson.

STROMBERG-CARLSON

FACTORY, GENERAL OFFICES: ROCHESTER 3, N.Y.
BRANCH OFFICES: CHICAGO 6, KANSAS CITY 8, SAN FRANCISCO 3
IN CANADA: STROMBERG-CARLSON COMPANY LIMITED, TORONTO

STROMBERG Telephone CARLSON

OU QUIPMENT AND INDUSTRIAL SYSTEMS • RADIOS, RADIO-PHONOGRAPHS AND TELEVISION

EDITORIAL

Tell Them About It

IN normal times most telephone service in this country, both local and long distance, is so generally excellent that even a slight deterioration in the quality of the service is immediately noticeable. That is a penalty the industry pays for doing its job so well when it can obtain the necessary facilities.

The public does not of course realize—and in fact it cannot be expected to realize, unless it is told—why telephone service has not been restored, by this time, to its prewar standard of excellence. The war has been over for a year—so why should there be delays in the installation of telephones, or why should toll service be slow, or other telephone service not up to its normal standard of excellence?

The most effective answer to the complaints of the public regarding the present telephone service situation, is to simply tell the public the facts—provided the telling is done in an effective manner.

The Northern Ohio Telephone Company, headquartered at Bellevue, Ohio, has done an extremely effective job of telling the facts about its situation to the people of its operating territory. Col. Wm. C. Henry, President and General Manager of this company—and also President of the United States Independent Telephone Association—can always be counted on to do a good job at anything he tackles.

The Northern Ohio company sent by first-class mail to all of its subscribers, a four-page printed folder, graphically illustrated, telling in simple and convincing language the facts about the telephone situation in its operating territory.

Five questions were propounded in the folder, and answered factually and completely. They were:

What is the telephone company doing to improve service?

When will new equipment be delivered?

Are more toll lines being provided in this area?

How many unfilled orders has Northern Ohio Telephone Company?

Will delays in long distance service continue to increase?

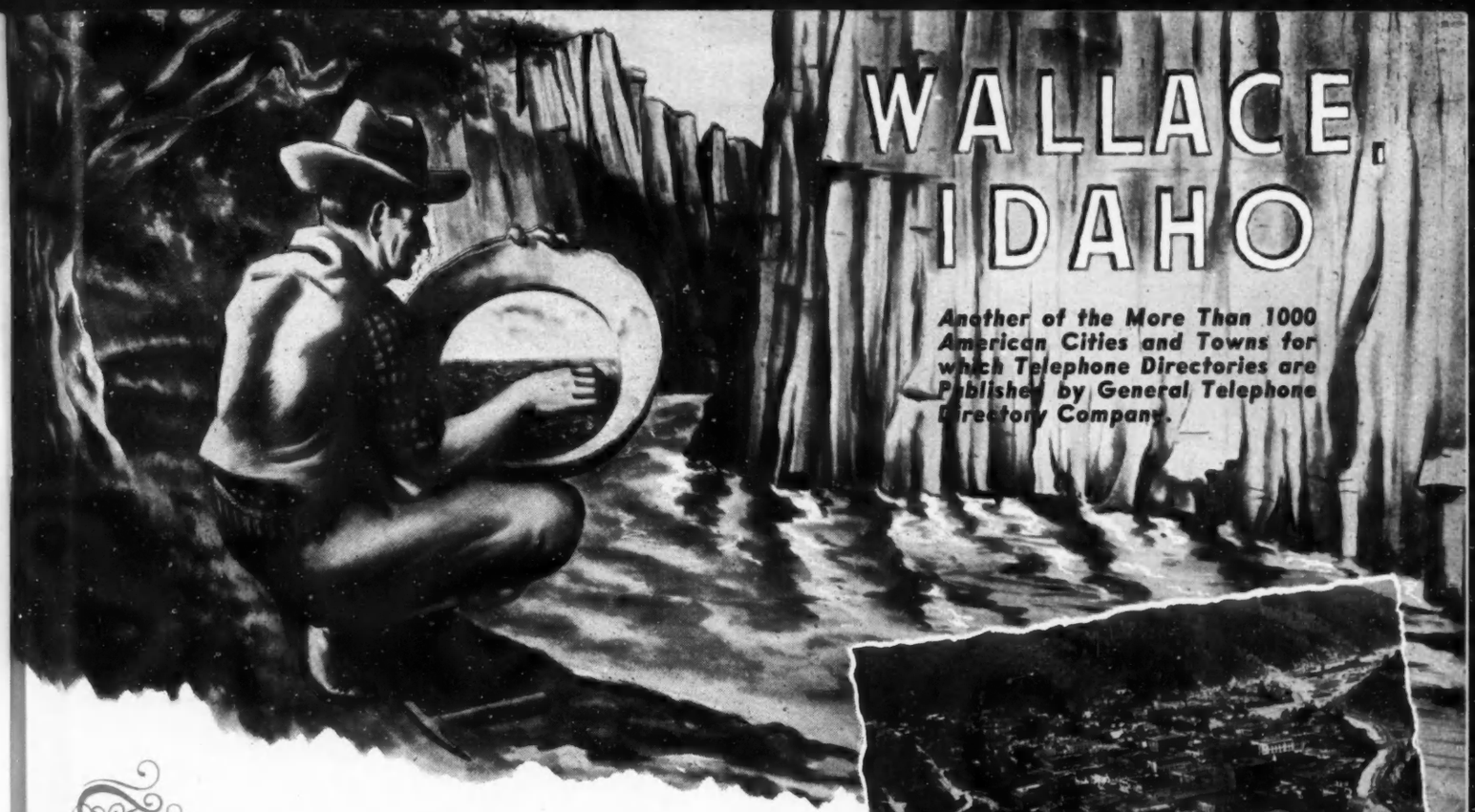
In answering these questions the company explains, among other things, that long distance calls increased by more than 50% during the war and have increased by an additional 22% since the end of the war; that the company has 3,024 unfilled orders for telephones last August, has installed telephones for 2,360 new subscribers since then, and now had 2,925 unfilled orders on hand.

It tells in detail about the equipment it has on order, and explains the delay in obtaining such equipment, and also some types of materials.

The presentation made by the Northern Ohio company covers a situation that is typical in the telephone field today. Most Independent telephone companies have about the same story to tell.

Many, perhaps most, of them are telling the story in one way or another, but some are not doing that. It would in our opinion be a great service to the telephone industry as a whole if every telephone company took the public frankly into its confidence, and told it just why the present telephone service situation exists.

The situation is one beyond the control of anybody in the telephone industry, both operating and manufacturing. It is somewhat aggravated in the public mind because the telephone industry does such a fine job in normal times. We suggest that if you haven't told your public about the reasons for it, you may be overlooking an excellent chance to improve your public relations.



WALLACE, IDAHO

Another of the More Than 1000 American Cities and Towns for which Telephone Directories are Published by General Telephone Directory Company.

THE LURE of gold led miners into the rugged valleys along the Coeur d'Alene River during the days of the roaring 80's. Instead of gold they found only disappointment, for no alchemy of nature could change the lead and zinc they found into the precious metal they sought.

Obstacle after obstacle was presented to the residents of Placer City, later named Wallace. It was not until the turn of the century that the mines began to show profits proportionate to the real value of the local mineral deposits. Since then, however, the mines in the Wallace district have paid over 197 million dollars in dividends. In 1945 alone these mines paid $4,046,334. Today Wallace is the unofficial "capitol" of the rich Coeur d'Alene mining district, one of the largest mineral producing areas in the world.

Though the town of Wallace today boasts hardly more than 4000 residents, it has progressed far beyond cities of much greater size in its civic development. The town is up-to-date in every respect and they have already broken ground for a new quarter million dollar memorial building in honor of their World War II veterans.

In 1936, little more than half a century after the original townsite was laid out, the Interstate Telephone Company, which serves the Wallace district, first employed the complete directory publishing services of our organization. During the decade since they added their name to our roster of satisfied clients, their gross advertising revenue from the Wallace Telephone Directory has increased nearly four times, and all the problems and details of directory publication have been handled by the General Telephone Directory Company.

If you contemplate changes or revisions in your present methods of directory publication; if you wish to increase your revenue from telephone directory advertising, and at the same time eliminate the details of proof-reading and the chore of preparing directories for mailing and distribution, we respectfully invite your inquiry.

Upper: Wallace has outgrown its original boundaries and the houses of many of its citizens are perched on the cedar-covered slopes above the town. So modern that "every alley is paved", Wallace has progressed in a civic way far beyond other cities of much greater size.

Lower: The pit-head of the Hecla Mine, near Wallace, is only the surface story of a mineral producer which has disgorged nearly 30 million dollars in zinc and lead since 1886.

A member of the "I Bombed Japan Club", Richard C. Clemmer, sales representative, is back with the General Telephone Directory Company after serving 27 months as a photographer in the Army. He participated in the Aleutian campaigns and the air offensive over the Kuriles.

GENERAL TELEPHONE DIRECTORY COMPANY

EASTERN OFFICE: BEN HUR BUILDING, CRAWFORDSVILLE, INDIANA, TELEPHONE 2270

WESTERN OFFICE: PRESS-TELEGRAM BUILDING, LONG BEACH 2, CALIF., TELEPHONE 672-22

Highway Maintenance Bodies
for
1½, 2, 3, and 4-Ton Trucks

HIGHWAY utility equipment engineers have made it their business to meet all requirements. That's why Highway Line Construction and Maintenance Bodies are available in many designs and sizes to fit various truck chassis. Whatever size you need, you are assured of the fine engineering, the organized convenience and perfect balance which have made Highway products famous.

Every Highway Maintenance Truck contains compartments, drawers, and cabinets correctly sized for their contents. Winches, power take-offs, derricks and towing hooks are *designed into the body*—not merely added as an afterthought. Every feature results from years of co-operation with leading utility engineers.

Highway Earth Boring Machines, Cable Reel Trailers, Pole Trailers, Winches, Power Take-Offs and Derricks are all designed for highest efficiency, ruggedly built for years of dependable service. Write to us about your immediate needs.

HIGHWAY TRAILER COMPANY

Manufacturers of: Utility Bodies • Winches • Earth Boring Machines • Pole and Cable Reel Trailers and other Public Utility Equipment.

General Offices: **EDGERTON, WISCONSIN, U. S. A.**

NEWS BRIEFS

Receives Vail Award

Carl A. Grenner, installer-repairman for Northwestern Bell in Duluth, Minn., has received the Theodore N. Vail memorial award for "noteworthy public service" presented by Northwestern Bell Telephone Co. The award, a bronze medal, a parchment citation and $100 in cash, was presented to Mr. Grenner for the rescue of Stuart Nelson from a burning room in his home. The award was presented by George A. Carlson, Minneapolis, general plant manager, and was the first award ever present in the Duluth district to an employee of the firm.

Missouri Association Convention Date Set

Missouri Telephone Association's annual convention will be held Nov. 18 and 19 at Hotel Governor, Jefferson City.

Radiotelephone Test in Oregon

Pacific Tel. & Tel. Co. has filed application with FCC, for construction permits on two fixed radiotelephone stations to test short haul radio toll service in mountainous area between Oregon City and Mt. Hood—a distance of 40 miles. This service will provide through connecting wire lines public message toll telephone circuits between Portland and Mt. Hood.

The existing facilities consist of one telephone wire circuit between Portland and Timberline Lodge on Mt. Hood, traversing wooded and hazardous terrain. The Pac. Tel. & Tel. application states that an additional circuit is needed to meet the public requirements, particularly when the landline is interrupted. The radio service would be operated in the 152-162 mc band and Western Electric equipment will be used.

Fire at Gilliam, Mo., Exchange

The Mid-Missouri Telephone Company office at Gilliam, which also serves Arrow Rock and Marshall Junction, was damaged extensively by a fire which burned off the roof of the building, causing service to be discontined for several hours.

Espich of United Telephone Dies

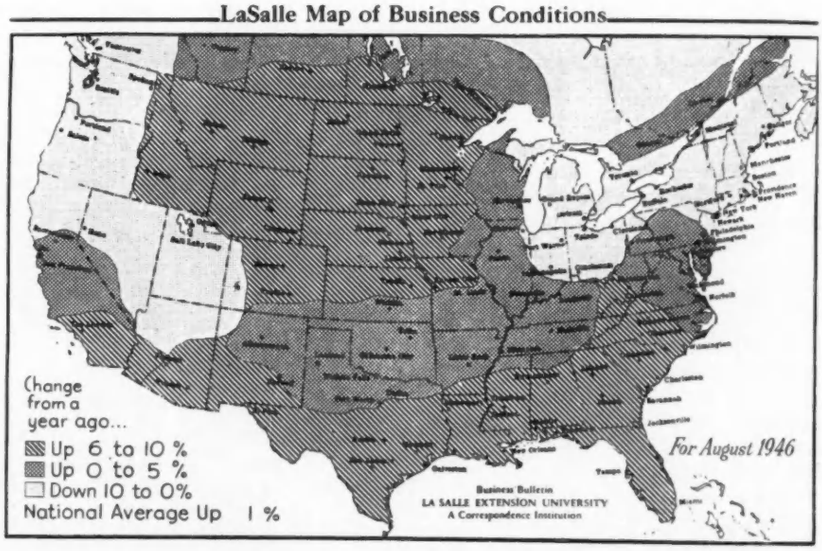
Herbert H. Espich, 54, district manager of United Telephone Co., Warsaw, Ind., died recently of a heart attack at his apartment.

Mr. Espich had been head of the United Telephone Co. since 1936, when he came to Warsaw from Plymouth, where he had started with the same company in 1917. He had been prominent in American Legion affairs, having been commander of both the Warsaw and Plymouth Legion Posts. He was past lieutenant-governor of Kiwanis and past-president of the local Kiwanis club. He also belonged to the Elks and Masonic orders.

Arthur W. Page to Be Southern Bell Director

An application was filed recently with the FCC for A. W. Page to hold the position of Director of Southern Bell Tel. & Tel. Co., while continuing to occupy the posts of vice-president and director of the American Tel. & Tel. Co. Mr. Page is resigning as vice-president Jan. 1, 1947, but will continue on the AT&T board of directors.

LaSalle Map of Business Conditions


Change from a year ago...
Up 6 to 10 %
Up 0 to 5 %
Down 10 to 0%
National Average Up 1 %
For August 1946
Business Bulletin
LA SALLE EXTENSION UNIVERSITY
A Correspondence Institution

Business has held up well during summer months, according to LaSalle analysis, in spite of many uncertainties, especially in prices and price control policies. Volume of business as measured by financial transactions is 1% higher than it was a year ago and the most recent preliminary reports indicate that somewhat higher levels can be expected this fall.

Communications developments in Great Britain are discussed in this enlightening article from the pen of Mr. Thompson. It is brought to you as an exclusive artic'e of this publication.

Telecommunications of the Future

By E. CHISHOLM THOMSON
Well-Known British Journalist and
Specialist on Technical Subjects

ENGINEERING research in Britain's Post Office is in full swing. Versatility and resource have been strengthened by the clamant needs of the Fighting Services and Government Departments, and many experiments which were temporarily abandoned in 1939 have now been resumed.

Mechanical tests with electrical parcel-sorting devices and equipments for stacking letters are being carried on side by side with the most advanced radio researches into the conversion of sound into electric waves and back again. Some of the latest experiments are concerned with the economical operation of the possible Transatlantic 'phone cable.

Post Office experiments are concentrated at the Research station at Dollis Hill, in the North West suburbs of London, which was erected on a carefully planned lay-out soon after the first World War to replace the very modest accommodation in the General Post Office building at St. Martins-le-Grand, in the City. Dollis Hill is a self-contained establishment, with laboratories equipped for research and development on telecommunication problems, as well as workshops for the construction of test apparatus, models and prototypes of new equipment.

On the severely mechanical side, the most interesting exhibits at the moment are the experimental machines, not yet in service, for coping with parcels and letters. Tests had begun just before the war and are now being resumed. One of the pieces of equipment under investigation, for separating letters from parcels, is in the form of a large tilted barrel, more than six feet in diameter. As the barrel is revolved by electric motor, the letters are seized by pairs of longitudinal rollers, rotating inwards, and deposited on conveyor belts beneath. Parcels, being too large for the rollers, work their way to the lower end of the barrel and into a container.

More delicate in operation is the letter stacking device, made up of continuous slots through which 600 letters pass in a minute. On the journey they are turned so that the stamp on each is in the right position for franking. The final check is made by photo-electric cell.

This is the nearest the Post Office has got to mechanical letter-sorting, and the engineers themselves confess that no device has yet been considered which would dispense with the human element in reading names and addresses.

The sorting and delivery of letters, with minor mechanical improvements, has changed little in a century; but in telephony—the great substitute for letter-writing—technical advances are almost continuous, and the research benches at Dollis Hill are concerned at the moment with a number of striking improvements.

Not the least interesting is the two-voice frequency system, already in use on some 2,000 trunk lines. The original test apparatus is still *in situ*. It is a time and trouble saver, whereby a subscriber on an automatic phone in a distant city can be dialled direct by one operator. All the necessary signalling is conveyed by currents of two frequencies within the voice-frequency range; neutralizing circuits prevent the mechanism from being set in motion by the speaking voice.

More money has probably been saved by "carrier working" on the telephone lines than by any other single communications invention. Originally known as "wired wireless", the system uses the telephone current in the same way as a radio carrier wave, and can thus accommodate a large number of separate and simultaneous conversations on different wavelengths. For this purpose British Post Office research

has incorporated the coaxial or concentric type of cable and repeater system which can carry 600 conversations at once into the trunk network. The terminal equipments are virtually small radio telephone transmitters all working on different wavelengths but all connected to the same line, each with its tuned receiver at the other end.

Another economical line of research is in the use of two ordinary speech circuits to convey high quality music transmissions for broadcasting. Whereas good speech quality can be obtained in a frequency band between 300 and 3,500 cycles, a musical transmission, to be satisfying to the critical ear, requires a width of between 50 and 5,000 cycles. The latest device at Dollis Hill splits up the original music transmission into three parts—low, medium and high frequency. The medium is sent over one line, and the other two are temporarily transposed to come within the 300 and 3,500 band and sent together over the second route. At the receiving end they are re-transposed and combined to reproduce the original music without any perceptible loss.

The possibility of a Transatlantic telephone cable has been brought nearer by several groups of experiments by the British Post Office. Stripped on one of the Dollis Hill benches is the world's first submarine cable repeater, which has just completed two years' successful tests on the sea bed between Holyhead and the Isle of Man. It enabled the number of traffic circuits to be raised from 24 to 48. The whole amplifying apparatus, with valves in triplicate in case of breakdown, is contained in a cylindrical metal container about six feet long and one foot in diameter. Power to work the repeater is supplied on the same wire that carries the speech. Work is now in progress to design repeaters capable of being worked in tandem and of operating under greater hydraulic pressure. The difficulties are great and it may be a long time before a complete solution is found.

A worker at the station adjusting a new repeater to be inserted in the Anglo German submarine cable which will enable the telephone circuits over a single conductor to be increased from 24-48.

Another ingenious device is the Vocoder. This is an arrangement suggested by the Bell Telephone Company of America and is being developed on both sides of the Atlantic. Its aim is to accommodate half-a-dozen or more simultaneous conversations each way within the ordinary voice frequency band. The voice is split up into ten narrow bands totalling only a few hundred cycles. At the transmission terminal the speech is analyzed so that the magnitudes of the components within ten frequency bands are known. Synthenizing equipment at the receiving end reconstructs the speech into a monotone or husky whisper, but an eleventh signal causes the re-constructed speech to be built up of harmonics of a fundamental frequency varying with the speaker's larynx tone. The result is perfectly intelligible speech, though the voice is scarcely recognizable. Conversations cannot be tapped except by a duplicate Vocoder equipment.

Sound-proof telephone earpieces were produced at Dollis Hill for use on tanks, and one of the exhibits in the acoustic laboratories is a plant for reproducing the noise of a Churchill tank at full speed. It was against such a noisy background that the soundproof phones were evolved.

One of the difficulties in speech and telephone tests is the measurement of sound pressures in confined spaces in such a way that the measuring instrument does not itself introduce errors due to its mere presence. The solution has been found in a special microphone designed to operate at the end of a tube with a diameter of 1/32 of an inch. The working end of the tube can be placed in the mouth or ear to measure sound pressures accurately.

One of the finest pieces of mechanism produced at the Research Station is the prototype picture telegraph equipment developed for Cable and Wireless Ltd. The gears had to be of the most delicate mesh, to prevent the slightest shake, and the machining needed accuracy of the order of 1/10,000 of an inch.

Some of the most important work at Dollis Hill during the war has been done by the Radio Group, especially in applying the piezo-electric properties of quartz to current problems. Research which began with the wavelength stabilization of short-wave telephone transmitters has

A workman soldering a wire to the quartz crystal for a new vibrator.

Raw quartz crystals and a finished quartz clock, a very vital part of telecommunications and radio transmission.

since been widely applied,—from enabling a bomber, flying blind, to determine its exact position over the target, to the development of a clock controlled by a quartz crystal which is probably one of the most accurate timepieces in the world, with an error of not more than one second in three years. A battery of these clocks has recently been built at the Post Office laboratories to the Order of the Astronomer Royal for installation at Greenwich Observatory.

The Dollis Hill station is well equipped for chemical, physical and metallurgical investigations. Spectrographic analysis enables minute particles of metal to be examined in the presence of large quantities of another metal. The proportions of the various constituents are determined by observation of the spectrum of light emitted by the sample when excited by electric sparks. Some alloys required for automatic telephone switches must not contain impurities exceeding 0.002 per cent.

One of the many wartime successes of which the British Post Office is justly proud was the development of a lacquer for use on direct recording discs. Before the war many of the lacquer ingredients came from Germany, but when supplies were cut off, the Research Department was asked to help. As a result an excellent all-British lacquer was produced, and the discs now supplied to the B. B. C. and the Services are probably better than anything made before the war.

Dollis Hill also designed improved cutter heads and evolved complete recording and playback equipments which are used not only for broadcasting and by Government departments, but for language training at London University.

A woman worker at the station compares a new cable to be used on telephone trunk lines, which has 4 wires only, with the old, which has 1080 wires.

A Step in the Right Direction

The constant effort of some Government Agencies to crowd private business out of the picture even though it involves wasteful duplications of facilities and a wreckless use of the tax-payer's money has been one of the discouraging trends in recent years. It is, therefore, with pleasure that we read of the mutual understanding recently reached by a Washington State Power Company and a local REA organization.

Under a pact drawn up, a joint committee would determine which of the two power service groups is in best position to serve new applicants for service. Line extensions to serve prospective customers are made by the organization whose lines are nearest to the applicant and which can therefore make the extension at the least cost.

The agreement also sets up conditions under which existing customers would be allowed to transfer from one organization's lines to that of the other group. Not only has this power company and the public power organization reached a mutual understanding with reference to avoiding wasteful line duplication but they are working closely together in connection with educational conferences and campaigns designed to stimulate the full use of electricity on the farm and to make power of maximum benefit to the farmers served. Let's hope that there is more of this common sense "American way" coordination of activities of private and public ownership groups.

Purchases New York State Exchange

George Beckwith is the new president and manager of the Ausable Valley Telephone Co., Inc. of Keeseville, New York. He was formerly connected with the New York Telephone Company.

Mr. Beckwith and associates have purchased controlling stock of the company which is located in Essex County in the Lake Champlain region.

✦

For telephone purposes the Bell Telephone System owns about 4,550 buildings and leases space in about 3,600 others, making a total of about 8,150 structures used in its nationwide service.

by B. C. BURDEN,
Technical Consultant,
Lincoln, Nebraska

Theory and Maintenance of

Electronic Power Supply Circuits

Part II—Mobile Power Systems and Filters

Fig. 11—Typical Dynamotor Power Supply Unit for Mobile Use.

General

THE use of radio telephone equipment in automobiles requires a different type of power supply system than is used with fixed installations which usually have commercial power available. The filament potentials for vacuum tubes used in mobile units are supplied by the six volt car battery, but plate and screen grid requirements, which may run as high as 500 volts, require some means for increasing the battery voltage to the higher value.

The d-c voltage required can be supplied either by small motor generators (dynamotors) or by vibrator type power supply units. Both are in common use but the dynamotor type is favored for commercial installations. The dynamotor unit consists of a single armature which is provided with a commutator on each end of the shaft and two armature windings. The six volt potential of the car battery is fed to one of the commutators and causes one of the windings to rotate the armature as a d-c motor. The second or generator winding, due to being revolved in a magnetic field, generates a d-c potential of from 300-500 volts depending on the design. This d-c potential is available at the brushes of the second commutator. Dynamotor units require little maintenance and are extensively used in connection with mobile radio installations of the type to be used by telephone companies for urban and highway radio telephone service. Figures 11 and 12 show a typical dynamotor power supply unit and its schematic connections.

Vibrator Type of Power Supply

The vibrator type of power supply unit utilizes a magnetic driven contacting vibrator, a step up transformer and a rectifying element. The low potential of the car battery is stepped up to a value of several hundred volts by pulsing the direct current from the battery through the primary of a step-up transformer. The high a-c voltage thus generated is then rectified.

Vibrator power supplies are classified as: (1)—the non-synchronous type, (2)—the synchronous type. The non-synchronous vibrator consists of a magnetically driven set of pole changing (reversing) contacts similar to those used in some types of telephone ringing machines, a step-up transformer, and a full wave vacuum tube rectifier.

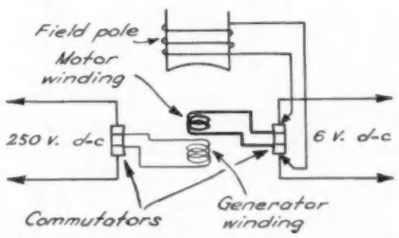


Fig. 12—Schematic Connections of Dynamotor Unit.

Fig. 13 illustrates the circuit of a simple non-synchronous type power supply. The contacts of vibrator coil A vibrating at a fixed frequency connect the car battery alternately to the two

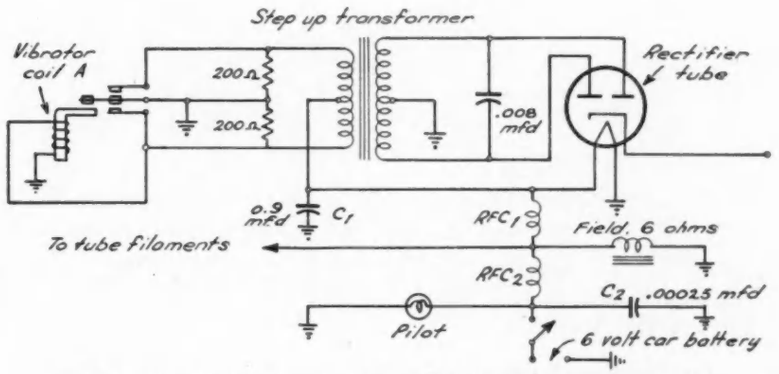


Fig. 13—Circuit of the Non-Synchronous Vibrator Type Power Supply Unit.

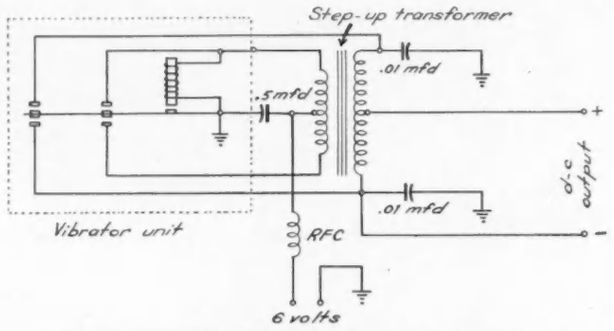


Fig. 14—Circuit of Synchronous Type Vibrator Power Supply.

halves of the transformer primary winding. The six volt potential is stepped up to several hundred volts on the secondary side of the transformer and is then applied to the full wave rectifier tube.

The d-c output from the rectifier tube is applied to a filter to reduce the ripple voltage. This type of system is not capable of supplying as high current to the load as is the dynamotor type.

Synchronous vibrator power supplies make use of a vibrator which pulses the six volt potential through the primary of a transformer and at the same time rectifies by pole changing action the voltage developed on the second secondary winding. The need for a vacuum tube rectifier is thus eliminated. It will be noted that a single vibrator armature carries both the pulsing and the rectifying contacts and that they move in synchronism so that current always flows in the same direction in the output circuit. Fig. 14 illustrates this type of unit. It is somewhat more prone to give trouble due to sparking, and is not as popular as the non-synchronous type.

Filter Systems

Most electronic power supply systems in common use are of the *full wave type*. Even though the sixty cycle alternating current power source is converted into fully rectified direct current there is present in the output circuit a substantial *ripple voltage*. The reason for this ripple voltage will be apparent from a study of Fig. 15.

Most vacuum tube applications require that this rectified d-c be "smoothed out" to prevent *power hum* from appearing in the output circuit of any radio amplifiers supplied by the power unit.

The smoothing out process is accomplished by a *filter system*. The filter consists of a capacitor-inductance network which acts as a storage reservoir to limit voltage fluctuations at the output of the circuit which would otherwise result from the rectified alternations of the a-c input voltage.

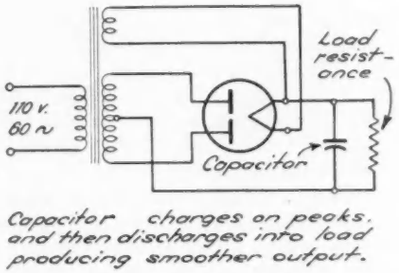

Load resist-ance
110 v. 60 ~
Capacitor
Capacitor charges on peaks, and then discharges into load producing smoother output.

Fig. 16—Full Wave Rectifier Using a Simple Capacitor Type Filter System.

Simple Capacitor Type Filter

One of the simplest filter systems is simply a capacitor connected across the output of the rectifier as shown in Fig. 16.

The capacitor charges on one-half cycle to essentially the peak voltage of the circuit and then slowly discharges into the load. Although the voltage across the capacitor falls off somewhat from the peak value to which it is charged, this drop is not nearly as great as takes place in an unfiltered circuit. The filtering action of a simple capacitor is shown in Fig. 17. For small current drains a filter system of this simple type is satisfactory, but for most electronic equipment more extensive filtering is required in the power supply system.

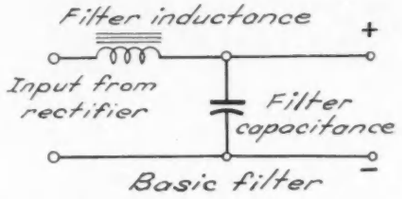


Fig. 18—Simple Filter System Using Inductance and Capacitance.

Inductance-Capacitance Type Filter

By using inductance and capacitance in combination, we have two elements, one which stores current and the other which opposes any change in the magnitude of the current flowing through it. By storing electrical energy in both the capacitance and the inductance a system is provided which smooths out the pulsations due to rectification and results in an output free from hum.

One of the simplest filter systems of this combined type consists of an inductance and a capacitor connected as shown in Fig. 18. A comparison of the ripple voltage present at the output of the rectifier and at the output of the filter is shown in Fig. 19.

A-C Ripple Voltage

The departure of the d-c output wave of a power supply system from the ideal wave (pure direct current) is usually stated in terms of the *a-c ripple voltage*. The figure of merit for any filter is the percent of this a-c ripple present in the output. The percent ripple voltage is *the ratio of the R.M.S. value of the a-c ripple voltage at the output of the rectifier tube to the R.M.S. value at the output of the filter*. If the filter is properly designed, it will have a ripple of only a few hundredths percent.

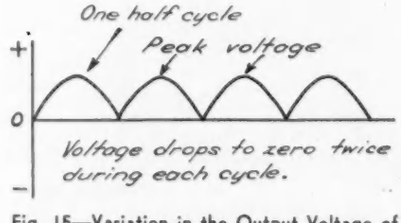


Fig. 15—Variation in the Output Voltage of a Full Wave Rectifier.

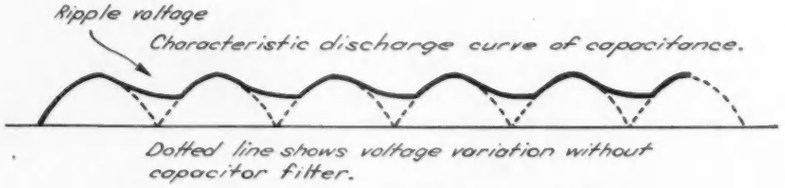

Ripple voltage
Characteristic discharge curve of capacitance.
Dotted line shows voltage variation without capacitor filter.

Fig. 17—Filtering Action of a Simple Capacitor Type Filter.

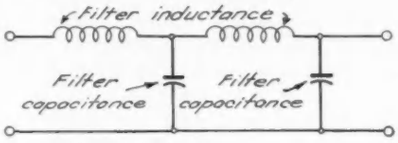


Fig. 21—The Choke Input Filter System.

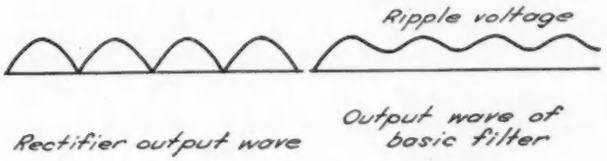


Fig. 19—Ripple Voltage Present at the Output of the Rectifier and at the Output of the Filter.

Single and Two Section Filters

Filters may be of either the *single* or *two section* type. The two section filter provides a smoother filtering action than a single section. Whether or not a two section filter is required in any specific case depends largely on the amount of amplification employed in the unit supplied by the power system and on other factors. The percent ripple voltage present in the output can be determined for single and double section filters by the following formula:

$$\% \text{ ripple} = \frac{1}{W^2 L_1 C_1} \text{ (Single Section)}$$

$$\% \text{ ripple} = \frac{1}{W^4 L_1 L_2 C_1 C_2} \text{ (Two Section)}$$

Where: L = inductance in henries; C = capacitance in farads; w = the ripple frequency x 6.28. The ripple frequency for a 60 cycle source is 120 for full wave rectification and 60 for half wave rectification.

Voltage Regulation

The ideal power supply system is one having an output voltage which remains absolutely constant regardless of variations in load current drawn from the output. Practical power supply systems do not normally reach this ideal and usually show a decreasing output voltage for an increase in load; i.e., as more current is drawn from the power supply unit, the terminal voltage falls off. This action in a power supply system is referred to as its *voltage regulation characteristic.*

If the voltage regulation of a unit is good, it means that the voltage falls off only slightly with changes in load. "Regulated type" power supply systems are available for special applications and are so designed that compensating effects which are provided in the circuit result in the output voltage being maintained absolutely constant over some fixed current range regardless of load changes.

The voltage regulation characteristic of a power supply unit is expressed as the *ratio of the change in voltage due to the full load current to the voltage which exists under the no-load current condition.* For example, assume that a power supply system has a terminal voltage of 350 volts at no load, but as the load increases to its full value, the terminal voltage falls off to 300 volts. The regulation of this system would then be as follows:

$$\% \text{ regulation} = \frac{350 - 300}{350} = 14.3\%$$

Power supply equipment of the type used with good commercial equipment usually has a regulation between 5 and 10 percent. The voltage regulation of a power supply system is largely controlled by the type of rectifying element and filter used.

The amount of voltage that will be lost (IR drop) in the rectifier element depends on the type. Mercury vapor tubes, for example, have a very low internal voltage drop and it is more or less constant regardless of load. The drop is about 15 volts. The high vacuum type of rectifier tube has a drop which is directly proportional to the load and is somewhat higher than that of the mercury vapor tube.

Effect of Filter Type on Voltage Regulation

The type of filter employed in a power supply system also affects the voltage regulation characteristic. What is known as the *capacitor-input filter* shown in Fig. 20 has much poorer voltage regulation characteristics than the *choke input filter* shown in Fig. 21. This is due to the use of an input capacitor shunted directly across the output of the rectifier tube. This capacitor charges up to the peak voltage of each half of the rectified a-c wave. But when load current is drawn from the power supply the voltage rapidly falls off to a lower value. The choke input type of filter keeps a high charging current from rushing into the capacitor and quickly charging it to the peak voltage of the supply source. Hence, the output voltage does not fall off so rapidly due to load current.

However, the output voltage of a power system which uses a choke input filter is, for the same transformer voltages, usually lower than that of the capacitor input type.

The choke input filter is usually required with mercury vapor rectifying tubes as its limits the inrush of current that takes place in this class of tube due to the fact that the tube (unlike the high vacuum type) does not start conducting until the input voltage has risen to some critical value, at which instant a heavy current flows into the capacitor. This abnormally high peak current (with capacitor input) that would otherwise flow would tend to shorten the tube life.

The chokes normally used in typical power supplies have an inductance of from 20 to 30 henries. Capacitors are usually of the electrolytic type and must have voltage ratings sufficient to with-

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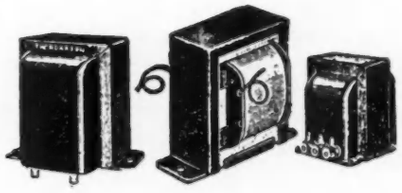
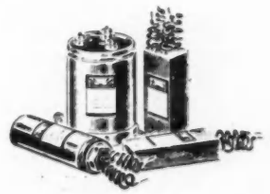


Typical filter inductances



Typical filter capacitors

Fig. 22—Typical Components Used in Modern Filter Systems.

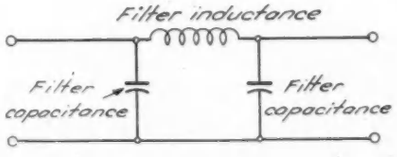


Fig. 20—Effect of Capacitor Input Filter on Voltage Regulation.

Roland C. Davies
Editor
Telecommunications Reports

Our WASHINGTON BUREAU Reports

By
ROLAND C. DAVIES
and FRED HENCK

THE Seventy-Ninth Congress wound up its affairs without doing too much, good or bad, either for or to the Independent telephone industry. Of the half-dozen measures pending as the Congressmen hurriedly wound up the session and rushed for home which would have had some effect on the industry, only one, the Social Security tax freeze, was placed in the statute books.

The lineup was something like this:

(1) The measure freezing Social Security payroll and pay taxes at one percent finally received the approval of both houses, after several days of late-hour jockeying which made it appear that the Congressmen would call the whole thing off. After the Senate had revised the House bill considerably, providing among other things the controversial variable grading provision, House Republicans reacted violently and indicated they would kill the bill rather than permit the upper chamber's changes to become law.

Finally, in a last-minute trade, the Republicans were successful in having the grading amendment—which would give the poorer states a larger hunk of Federal assistance in Social Security payments—eliminated from the measure, and in return permitted larger payments to blind and disabled persons. Thus the one percent freeze, which was not opposed strongly anywhere along the line, went into the books. Had it not passed, the statutory 2½ percent rate would have gone into effect next January 1.

(2) Despite little opposition to its basic philosophy, the Gwynne Bill, strongly supported by the Independent industry, didn't make it. After the Senate jumped its statute of limitations to three years—the bill as introduced had a one-year limit—the House did not take up the revised measure in its closing sessions. The bill's proponents apparently felt that the restriction was getting too close to the present five-year one to be of any great value. The measure, which would give employers some protection against the vagaries of the Wage-Hour Administrator, who by new interpretations can now make operators of businesses who have acted in good faith suddenly liable to suits for retroactive damages, remains unfinished business for the next session.

(3) The Independent industry never did get its exemption from minimum wage law provisions raised to 1,000 stations from the present 500, although at one time that appeared to be fairly certain. The Biemiller petition to discharge the House Labor Committee from consideration of the measure, after the Rules Committee had shelved the bill, did not receive sufficient signatures. In a significant remark just before Senate adjournment, Majority Leader Barkley termed minimum wage legislation one of the things Congress should have done but didn't, and it is certain it will be high on the Democratic agenda when the next Congress convenes.

(4) Women's "equal pay for equal work", strongly supported by the National Federation of Telephone Workers, was shelved in both houses. Senate Republicans, led by Taft and Ball, vigorously objected when the measure came up on a calendar call, and refused unanimous consent. On the House side, the Rules Committee refused to permit the measure to come up on the floor.

(5) Neither the House nor the Senate Interstate Commerce Committees was changed in status by the Congressional reorganization bill, passed by both houses and signed by the President. Size of the groups was also left about the same, and their membership will be about unchanged next session, barring election upsets.

(6) The Tobey resolution to investigate the FCC died a quiet death very soon after it was introduced. Although the New Hampshire Republican declared the move was "no idle gesture," he abandoned it quickly after conferences with a few top-ranking Senators. The resolution was aimed primarily at the Commission's alleged control and censorship of broadcast programming, and probably would not have been expanded into common carrier affairs.

Files Exception to Bus Mobile Decision

A sweeping exception to the proposed report of the FCC, which granted most of the requests of the National Bus Communications, Inc., presented in the "test case" hearing on bus mobile radiotelephone, has been filed by the A.T.&T. The telephone system objected most vigorously to

the commission's conclusions based on comparative cost of service statistics.

Objection was centered on the proposed report's statements that "a system operated by the bus industry itself will probably be able to meet the service demands at substantially lower cost to the bus operators" than a system provided by the existing communications common carriers, and that "the evidence leaves little doubt, however, that the costs of use of the existing common carrier systems would exceed those of the proposed industry-operated system."

The exception termed the conclusions as speculative. It pointed out that estimated costs of the bus service to be provided by the common carrier are based on the assumed use of public message radiotelephone service, although the companies are prepared to offer it on a private line basis. The A.T.&T. added that telephone companies furnishing the service would have available economies not possible to a separate organization, and contended that the Nabco estimates ignore the possibility of using the telephone companies' substantially cheaper dispatching service.

NFTW Prepares for 1947 Bargaining Campaign

The National Federation of Telephone Workers will begin consideration of items to be taken up for 1947 in national bargaining at sessions slated to begin in Washington August 19. The National Bargaining Planning Committee will delve into matters termed "representative" at the Galveston National Assembly, including basic wages, premium payments, shop status, vacations, pensions and sick benefits, check-off of union dues, leaves of absence for union officers, shortened work week and work day, differentials, job descriptions, holiday pay, seniority, grievance and arbitration procedure, progression schedules, veterans training, and others.

Meanwhile, it is understood that the NFTW Pension Committee will draw up plans for Bell System workers aimed at $100 monthly minimum pensions, computing of the pensions over the highest five-year earning period instead of 10 years as heretofore, and elimination of the deductions of other benefits, such as Social Security payments, from the pensions.

The NFTW's one national union constitution, agreed upon by the Galveston Assembly, has been completed by the Constitutional Committee, and has been submitted to member unions. Suggestions and recommendations of the member organizations are to be in the hands of the committee before August 31, and the entire process of consideration of the document is expected to be completed by October 1.

Convention Dates

South Dakota Association, Hotel Carpenter, Sioux Falls, September 11 and 12.

Michigan Telephone Association, Hotel Olds, Lansing, September 18 and 19.

USITA National Convention, Stevens Hotel, Chicago, Illinois, October 14, 15, and 16.

Virginia Telephone Association, John Marshall Hotel, Richmond, November 7 and 8.

North Carolina Telephone Association, Pine Needles Hotel, Southern Pines, November 11 and 12.

South Carolina Telephone Association, hotel not selected as yet, November 14 and 15.

Alabama Telephone Association, Jefferson-Davis Hotel, Montgomery, November 18 and 19.

Missouri Telephone Association, Hotel Governor, Jefferson City, November 18 and 19.

Georgia Telephone Association, Henry Grady Hotel, Atlanta, November 21 and 22.

Florida Telephone Association, Marion Hotel, Ocala, November 25 and 26.

Nebraska Association, Lincoln Hotel, Lincoln, April 8 and 9, 1947.

FCC to Continue Operations As Usual for Remainder of Summer

The FCC will continue operations as usual for the rest of August and the remainder of the summer, despite earlier indications that the Commission would virtually close up during the rest of this month to permit Commissioners and staff personnel their first extended vacation since World War II began. Present plans call for a quorum of Commissioners to be present in Washington at all times, so that no time will be lost in tunneling through the agency's still-tremendous work load. The backlog consists mainly of broadcast matters, however, and not too much telephone work is involved.

The Commission, incidentally, in another "pioneering" grant, has given its first authorization looking toward the development of an industry radio service. The first construction permit in this field was given to the Pullman-Standard Manufacturing Co. to test radiotelephony in directing switch engines within the company yards at Michigan City, Ind. The authorization, the FCC said, is directed at enabling industry to utilize mobile radiotelephone for increasing the efficiency of plant operations as well as contributing to safety of life and property. One land station and six mobile units will be installed by the company, using Galvin-Motorola equipment.

NWSB Approval May Be Sought Before or After Boost

Approval of future wage or salary increases subject to the indirect control of the National Wage Stabilization Board—virtually all wage boosts come in this category—can be sought either before or after the increase is granted, but unapproved wage boosts will still not be recognized as a basis for increasing price ceilings, Board Chairman W. Willard Wirtz has announced in an analysis of the effects of price control extension on the NWSB. The interpretation constitutes an amendment of the Board's regulations.

Mr. Wirtz emphasized that wage and salary increases subject to indirect control made during the period when the price control act was not operative must be approved by the Board if they are to be used as a basis for requesting price adjustments. Only pay increases in the building and construction industries, wage decreases, and salaries for new plants or new jobs come under so-called direct control.

Important Hotel Case

In an important case which may have a bearing on all hotel-telephone company relationships, the Bell Telephone Co. of Pennsylvana has asked the State Public Utility Commission to dismiss a complaint made by the state's hotel association which would negate the telephone company's 15% commission rate paid on toll business to the hotels.

The hotels asked the commission to consider the previous 20% commission rate effective. Bell of Pa. changed its contracts with the hotels about two years ago, after the Supreme Court finally ruled out hotel surcharges, but some hotels have refused to consider the new contracts valid and have con-

(Please turn to page 62)

Meeting at Macon, Missouri on July 16, 1946.

By ROBERT W. HEDRICK

Missouri Association Holds District Meetings

DISTRICT meetings of the Missouri Telephone Association came out of wartime mothballs with three highly successful sessions at Macon, Rolla and Springfield, Missouri, the week of July 15, covering three out of the Association's five districts in the State.

Highlighted in each case by a talk by Ralph E. Duffy, Chief Engineer of the Missouri Public Service Commission, the meetings exceeded expectations in attendance, and focused renewed attention on the problems and possibilities ahead for Missouri's 437 independent companies.

Attendance at Macon, north Missouri exchange of the Missouri Telephone Company, was 125, with 23 companies represented from 40 exchanges. At United Telephone's Rolla exchange meeting, total attendance again approximated 125 with 27 companies and 38 exchanges represented. The final meeting at Springfield brought representatives from 36 companies and 47 exchanges, for a total attendance about the same as the previous two meetings.

A dramatic touch was added when Dr. S. T. Neill, president of the association, spoke from his sickbed in Clinton, Missouri, to open the Springfield meeting on July 19. His talk was carried by long distance to Springfield and broadcast over a loudspeaker. Dr. Neill is one of the real telephone pioneers of Missouri, having been active in the business since 1899.

In his talk, Dr. Neill emphasized that "the telephone business is a good business", and expressed his regret that he could not be present to "have grasped the hand of each one, met old friends and made new ones." At the close of his talk, the applause of the audience reached him via a telephone switched on to the direct circuit to Clinton.

Introduced by Association secretary Robert W. Hedrick as "the man directly in charge of telephone properties in Missouri", Chief Engineer Duffy's remarks were especially pertinent in this time of rising costs. He emphasized the responsibilities of every telephone company, large and small, to give service up to the highest standard, whether local or toll, and dwelt at length on the need for adequate revenues to insure proper plant to do this job. This in turn, he said, demands careful measurement of their plant investment, historically and currently. Stating that experience has shown many small companies to be ignorant of the true value of their property, he urged that every independent —"for his own sake"—get his plant figures in line with the original cost theory now being followed by the Missouri Public Service Commission as a guide to rate-making.

Mr. Duffy mentioned the case of a small company which carried its property at $4,000, and complained frequently that on that rate base it was not able to make money. Upon investigation by the Commission, it was found that the true "original" cost of the property was far in excess of that figure. Suggesting that many companies were in the same situation, the Chief Engineer divided the job of plant valuation into two parts:

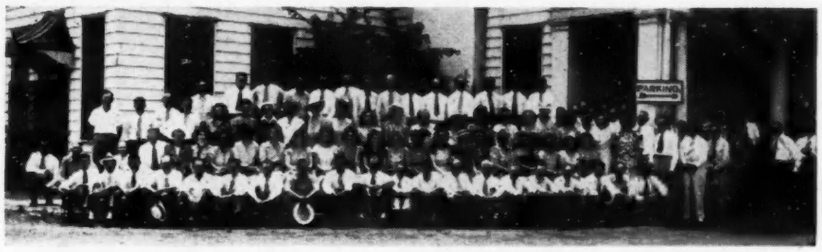
1. The historical part. This, he said, is sadly neglected on the part of most small companies. He advocated a thorough inventory of all plant property, item by item, listing all pertinent information such as age, model, make, etc. When this is done, reference to old catalogues of suppliers will yield the cost of that material, which will then form a proper part of the rate base. If adequate records are not available, he offered the services of the Commission staff in pricing out the value of property as of the time it was installed, through the use of the cost records maintained in the Commission offices. This offer of Commission assistance was particularly noted by the audiences at all three meetings.

2. The current part. Mr. Duffy seconded Mr. Hedrick's remark that the majority of the independent telephone

men are telephone men first and bookkeepers second. He pointed out, however, that this is the very reason for lack of adequate historical investment records on the part of most small companies. He urged that careful record be kept of every cent spent for plant investment, and suggested a plan of centralizing bookkeeping records of this sort. The plan of a young Californian, in the grocery field, to handly daily and weekly expense records for a large number of small independent food merchants, was presented by Mr. Duffy as one easy, inexpensive means of solving the telephone companies' problems. If this current bookkeeping job is not done properly, he warned, it will be impossible for independents to know what their costs are, and as a result, they may lose credit for plant investment which would otherwise be a part of their rate base under the original cost plan.

At each of the three meetings, Mr. Duffy's remarks were followed by a short statement on rural telephone plans. At Macon, the speaker was James Carter, owner of the Perry, Missouri, company; at Rolla, Carl Spaid, President of United Telephone; and at Springfield, W. E. Naylor, General Commerical Supervisor of Western Light and Telephone filled the bill. These plans included the program of the Southwestern Bell Telephone Company to add 3,500 new farm telephones in Eastern Missouri alone this year. Discussion included emphasis on the need for maintaining rural lines in shape to give service equal in quality to local exchange service. Metallicizing of grounded lines was mentioned as a "must job", particularly with the spread of rural electric lines and consequent interference on grounded circuits.

Following this, a showing was made of the Bell System movie on farm service—"The Farmer's Telephone", followed by lunch. One of the highlights of the luncheon period was the presentation of the Bell film "The Telephone Hour", a pictorial presentation of the Bell System network broadcast which contained much of interest about network broadcasting and television, in addition to providing top-notch musical entertainment.



Rolla, Mo., was host to Missouri Tel. Ass'n. District Meeting on July 17, 1946.

Afternoon periods were divided into Plant and Traffic meetings, at which operating problems came in for a thorough discussion. Plant sessions were headed by J. W. Kreamer, Plant Superintendent of the United Telephone Co., with discussion led by Henry Altpeter, Eastern Missouri Division Plant Engineer, Southwestern Bell. General Maintenance problems, lightning protection and grounding, and rural construction were principal topics discussed in the 2-3 hour meetings.

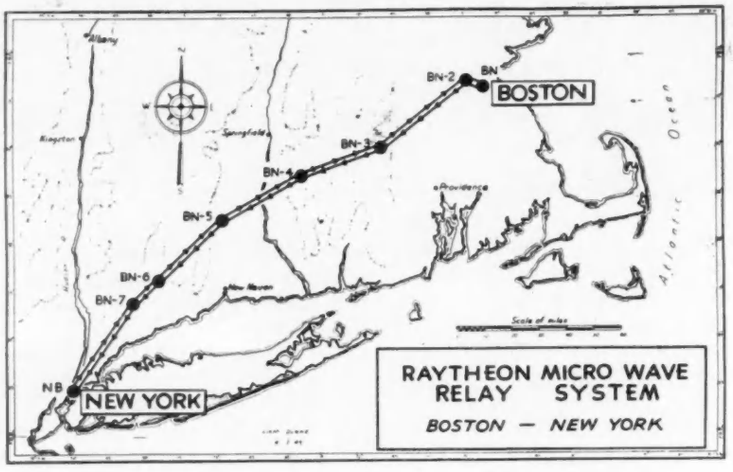
Traffic sessions devoted most of their time to practices designed to handle as many calls as possible on toll circuits—particularly important in view of delays currently being experienced on delays at Missouri toll centers. Chief operators and operators were conspicuously present among the 50-60 persons attending each Traffic meeting.

Tributary toll operating, and preparation of toll tickets were primary points discussed at these sessions. A memorandum made available to everyone present was headed in part: "Toll circuits and switchboards are overloaded in most offices. This condition can be materially improved by the use of correct operating practices. . . . Following are some of the more important practices of this type:

1. A minimum of time and charge requests.
2. Don't make memorandum tickets on outward originating calls if a circuit is available.
3. Don't make unnecessary ticket records on incoming collect calls.
4. Hold your customer on the line.
5. Give a prompt answer to inward signals.
6. Clear and release toll circuits promptly.
7. Always give a full two-second ring on toll lines.
8. Challenge on "way" circuits.
9. Leave a call order when you encounter NC at an intermediate office, even though you have not reached the toll center.
10. Pass the filing time on delayed calls . . . challenge and quote your filing time when you meet another operator on the circuit.

(Please turn to page 56)

Delegates to District Meeting held at Springfield, Mo., July 19, 1946.



By DONALD K. DE NEUF

Boston-New York MICROWAVE

Experimental Communication System

THE extensive radar development work during World War II offers the field of communications a vast store of knowledge and techniques required in putting to practical use the extremely high radio frequencies now commonly known as "microwaves." These frequencies are generally considered to lie in the range of 1,000 megacycles to 30,000 megacycles. The application of microwaves to communication and signalling purposes not only greatly expands the magnitude of the radio communications spectrum but offers some highly important advantages.

Radar requirements called for a combination of extremely narrow and sharply defined beam of radio frequency energy and the employment of sufficient power to provide for adequate amount of echo, or reflective return of the transmitted energy from various objects on which highly accurate information was desired from the standpoint of range (distance) and bearing (relative position) from the point of transmission. The required definition could only be obtained by the employment of antennas which would provide an extremely sharp pattern in the form of a beam preferably only two or three degrees in horizontal width. The construction of such an antenna suitable for the purpose employing frequencies at which sufficient power could be generated to produce a useable amount of echo involved a structure of such large physical dimensions that it was impracticable for use aboard surface vessels, and completely impossible for airborne purposes. The problem was obvious, but the solution was not simple.

Since it was feasible to design and construct radar antennas of practical sizes and forms for shipboard and airborne purposes employing frequencies in the order of 3,000 megacycles (10 centimeters) and higher, some means would have to be developed for the generation of sufficient power to produce an echo, or target reflection of sufficient magnitude to be utilized for satisfactory radar operation. This requirement demanded a completely new approach to the problem of frequency generation. The conventional transmitting tube design had reached its limit with respect to ability to produce any appreciable amount of power at frequencies measured only in hundreds of megacycles, let alone thousands, for reasons of capacity effect between the tube elements.

One of the war's outstanding technical accomplishments was the development of the magnetron. It bears no physical resemblance to the conventional tube whatsoever, and is similar only from the standpoint that a hot cathode in a vacuum is employed. The technique of superhigh frequency generation in the magnetron involves the use of a magnetic field and a series of cavities which resonate as the electrons emitted by the cathode are whirled past them at an extremely high rate of speed by the magnetic field. Peak powers, on a pulse basis in excess of 600 kilowatts at frequencies in the order of 3,000 megacycles for radar are commonly employed.

Thus, with a frequency generator of adequate power in the microwave spectrum employing small high gain parabolic types of antennas, both vessels and aircraft were provided with an efficient device of extremely high accuracy for detection of the enemy, fire control and navigation purposes under weather conditions of fog, rain, and snow, in the darkness of night as well as during the light of day. Targets and objects invisible to the naked eye could be detected many miles distant.

The principles of microwave frequency generation, transmission, and reception utilized in radar are adaptable to the communication of intelligence from one point to another, in place of transmission of energy from one point and receiving in return at that point a reflection of the transmission from a target, measurements of which reveal the distance and position of said target. The Raytheon Manufacturing Company as the sole producer of SG and SO series of surface-search radar and a wide variety of magnetrons and associated vacuum tubes has developed extensive engineering knowledge

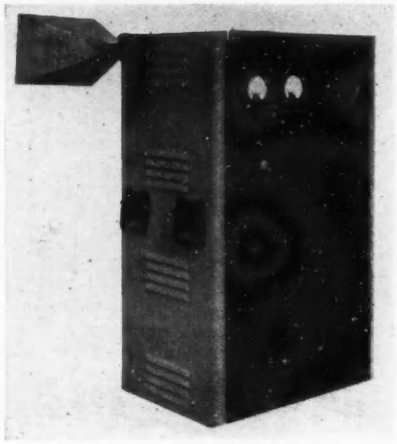


Fig. 3—Horn type parabolic reflector.

and techniques in the field of microwave transmission and reception. It has applied this knowledge in the development of microwave communication systems and equipment and has been granted experimental station licenses for this purpose by the Federal Communications Commission.

The Company has installed an experimental system between its plants at Waltham, Mass., on the outskirts of Boston, and its New York City office on the top of the Lincoln Building, with automatic repeater stations located at Waban and Webster, Mass.; Tolland, Bristol, and Oxford, Conn.; and Lewisboro, New York (see map opp.). A two-way circuit is operating 24 hours per day between Waltham and New York City, carrying various types of intelligence on an experimental basis. The present experimental equipment provides for an intelligence band of 30 to 16,000 cycles per second, suitable for standard 4-channel voice frequency carrier telephone equipment or high quality FM broadcast program relay. Equipment for extending the upper limits of the intelligence band is readily available if commercial requirements so dictate.

The Fraim system of emission is utilized involving an FM subcarrier limited into square waves which modulates a magnetron output tube. Frequency transposition operation on the relay circuit employs the frequencies of 3990 and 3890 megacycles. Depending upon the particular equipment in use, output powers up to 50 watts are employed. The signal-to-noise ratio over the circuit averages 50 db. No synchronization between transmitters and receivers is required for operation of the circuit and adjustments are extremely simple. Unattended repeater station operation exists at relay points with only routine servicing attention required.

Two types of antennas are in general use, the parabolic reflector (see Figure 2) and the horn type (see Figure 3) depending upon the nature of the particular installation and characteristics of the circuit path. The former offers a gain of 30 db., the latter a gain of 25 db., for the average installation. The transmitting and receiving antennas located at one station may be physically juxtaposed as depicted in Figure 2.

Microwave frequencies are quasi-optical in nature; i.e., they possess some of the characteristics of light waves. For this reason the location of a transmitting antenna must be within "line-of-sight" distance of the corresponding receiving antenna so that the curvature of the earth's surface or terrain profiles such as hills and mountains will not interfere with or bisect the circuit path between the two. In some cases, where a terminal or repeater station is sufficiently high in elevation the antennas may be installed directly on the building housing the equipment. In other cases it may be necessary to employ a tower to gain sufficient height to attain the required optical path between the transmitting and receiving antennas. Raytheon has experimented with one section of its circuit by eliminating one repeater station where intervening terrain causes the receiving and transmitting antennas to be some 250 feet below a true optical path for the distance of 64 miles. While satisfactory communication is often maintained for hours at a time over this section of the circuit, with periods of abnormally high signal strength caused by the movement of "cold fronts" (a mass of cold air above the terrain) it has been determined that only line-of-sight circuit paths can be utilized for reliable and consistent signal transmissions at the microwave frequencies.

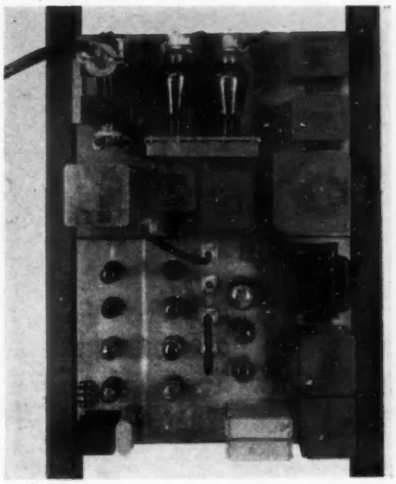


Fig. 4—Interior of typical 50 watt fixed-station 4,000 mc transmitter.

Among the advantages offered by microwave communications is the absence of circuit interference caused by atmospheric static and lightning storms and "man-made" noise resulting from street car and elevator motors, automobile ignition, and the like. The effect of aircraft bisecting the transmission path has been determined as negligible insofar as circuit continuity and quality is concerned.

The microwave frequencies are not reflected by the ionosphere resulting in an important advantage in the operation of a large number of transmitting stations on the same frequency since "skywave" interference, common on the lower frequencies, is absent. Because of the

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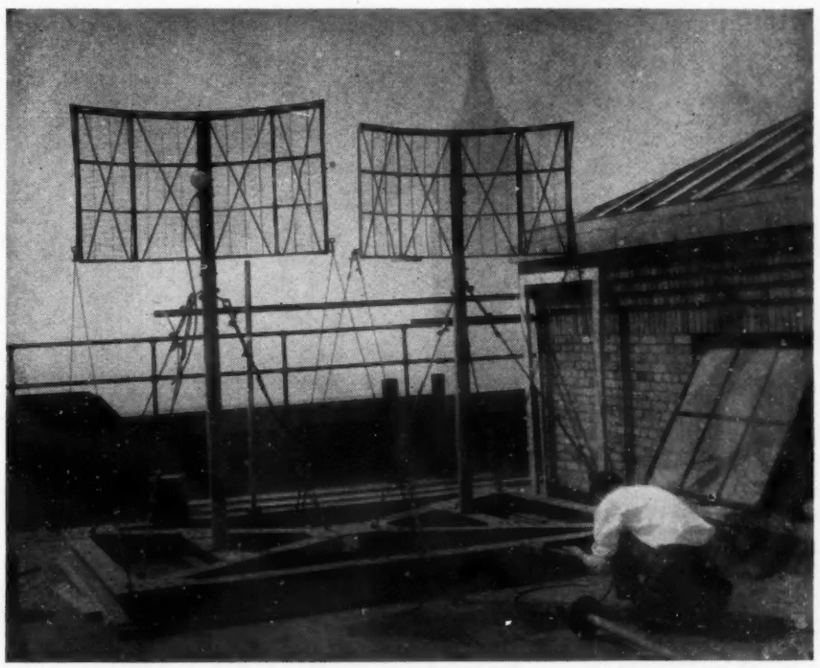


Fig. 2—Parabolic reflector.

Personalities IN THE NEWS

C. M. Sorum is the new owner of the Kindred (N. D.) Telephone Exchange, sold to him by **J. G. Owen,** former owner and manager. Mr. Sorum, who also owns the Abercrombie (N. D.) Telephone Co., hopes to install a dial system soon.

●

Simpson Utterback, 71, retired telephone man, died at the Hand Hospital at Shenandoah, Iowa. Mr. Utterback had been a resident of Shenandoah for 23 years, and before that time had been in the telephone business at Imogene, Ia.

●

Edgar Kaup, formerly of Spencer, S. D., has purchased the Hanson County Telephone Co., Alexandria, S. D., from **H. M. Schumacher.**

●

Cecil Stokes is the new manager at the Summer exchange of the Iowa State Telephone Co., Newton, Iowa.

●

Mr. and **Mrs. Robert Dutcher** have purchased the Maywood (Neb.) Telephone Co. from **W. E. Embrey.** Mr. Dutcher, who has been in the telephone business since 1904, is planning considerable improvement of the plant, and hopes to build a new telephone building when materials are available.

●

Dr. Oliver E. Buckley, president of Bell Telephone Laboratories, announced that **Dr. Ralph Bown** has been named director of research of the laboratories. He succeeds **Dr. M. J. Kelly,** who has been serving both as director of research and executive vice president. Dr. Kelly will continue as exec. vice pres.

●

Mrs. Anna Savidge of Ewing, Nebraska, has sold the Savidge (Neb.) Telephone Co. to the Clearwater (Neb.) Telephone Co.

John McElroy

John McElroy has been named assistant advertising manager for Copperweld Steel Co., Glassport, Penn., as announced by A. R. Teifeld, advertising manager.

Mr. McElroy was formerly with the sales promotion dept. of Standard Brands, Inc., of New York City. Prior to that he was asociated with American Cyanamid Co.

●

George B. Proud, treasurer of Western Electric Company since 1941, will retire in accordance with the company's retirement rule on October 31, following 37 years of service. **H. H. Reddall,** chief auditor, has been elected to succeed Mr. Proud.

●

Attorney-General J. Clair Killoran has been requested by the State of Delaware to bring suit against AT&T for $138,489, claiming unpaid wire mileage in Delaware for 20-year period.

George Shaw, Sr., connected with the Northern Ohio Telephone Company's exchanges at Ashley and Ostrander, died after maintaining an unbroken service record with the company since 1913. One son, George Shaw, Jr., has just completed 25 years at the Delaware, O., exchange.

●

P. M. Ferguson, manager of the Mankato (Minn.) Citizens Telephone Co. announces the installation of 301 new telephones in the past six months.

●

George H. Rogers, secretary of Bell Telephone of Canada, has retired and will be succeeded by **Simcoe C. Scadding.** Mr. Rogers is a veteran of more than 40 years service, first with the old National Tel. Co. in England, and with Bell in Canada since 1906. Mr. Scadding has been with the company since 1923, and before his appointment to secretary was assistant comptroller.

●

Frank F. Hoke, manager of Watseka, Illinois branch of Illinois Bell, has completed 40 years service, 26 years as manager of the Watseka exchange.

●

Gordon L. Heuring, 48, veteran Northern Ohio Telephone Co., Bellevue, Ohio, lineman, died after an illness of two years.

●

William J. Sullivan and **Charles O. Jackson,** have retired from Mountain States Tel. & Tel. Mr. Sullivan, who was Utah construction superintendent, counts 41 years of service with the company, while Mr. Jackson, former manager at Springfield, Colo., totals 40 years of telephone service, 18 with Mountain States.

●

Charles E. Fortier, publicity director of Canadian Bell, has retired after 41 years of service with the company.

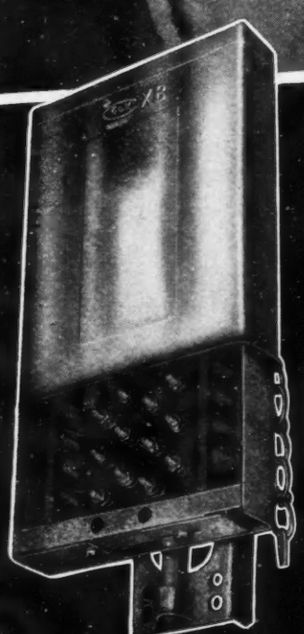
Stubbing XBs

not by tens—nor hundreds—but *by the THOUSANDS!*

Cook XBs are specified as standard by so many companies that our production schedules call for consistently high output. This permits a higher degree of specialization, improves the quality of our work, and keeps these terminals flowing to users *on time.*

Among the many proved-in-service features of the XB are:

1. All ferrous parts of Toncan Iron, formed, assembled and hot dip galvanized.
2. Non-corroding Everdur studs with tinned solder shoulders.
3. Single piece molded Bakelite face plate and fanning strip with raised stud mountings to increase insulation mountings.
4. Patented weather guards to exclude snow, rain, dirt, and insects at drop wire openings.
5. Patented cable entrance and cable holding sleeve to provide secure and tight cable joint.
6. Heavy reversible zinc hood that permits mounting with stub at either top or bottom.



● The Cook Type XB Cable Terminal (unprotected). Available in 6, 11, 16 and 26 pair sizes.

If you do not have one—send for your copy of the Cook Telephone Catalog.

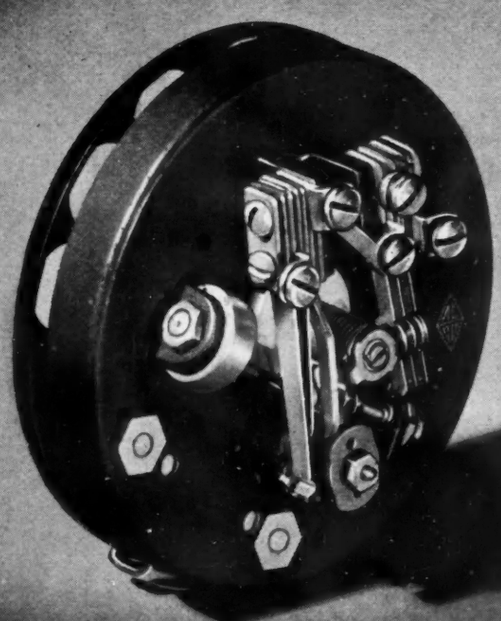
COOK ELECTRIC Company

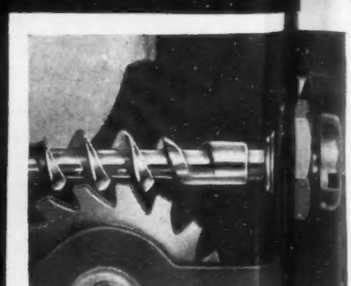
Telephone Protection & Distribution Engineering Since 1897

CHICAGO 14 ILLINOIS

IN THE AUTOMATIC ELECTRIC DIAL—

It's what you





Governor worm is accu
cut — turns smoothly o
thrust bearing.

Don't see that counts!

TAKE A LOOK at the Automatic Electric Dial — operate it just once — and you ***know*** why it is the chosen standard for hundreds of telephone companies all around the world. Its silk-smooth operation tells an unmistakable story of sound design, fine quality construction, and long trouble-free service.

But the real secret of this dial lies in the things you cannot see. It lies in unique design features which have grown out of fifty years of experience in dial manufacture—

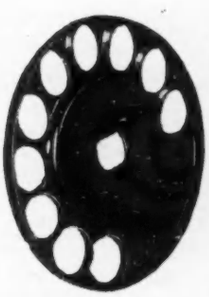
In the craftsmen's skill which faithfully transfers these features from blueprint to finished product—

In the careful selection of material from which each part is formed for its exacting task—

In the exhaustive tests which safeguard every step of manufacture from raw material to finished product—

In the unique production methods and specially designed equipment needed to produce millions of dials — each one meeting highest standards of performance.

No wonder the Automatic Electric Dial has proved — both by laboratory tests and by field experience — to be the longest-lasting dial ever made. When you need dials, you can have no safer guide than that!



Flanged finger-plate provides greater strength, minimizes "fly-wheel effect."

AUTOMATIC ELECTRIC

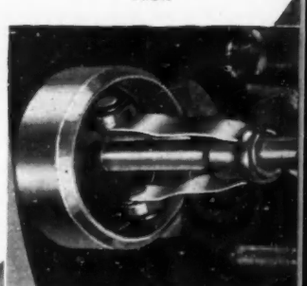
Originators and Developers of the Strowger Step-by-Step "Director" for Register-Sender-Translator Operation . . . Machine Switching Automatic Dial Systems

Makers of Telephone, Signaling and Communication Apparatus . . . Electrical Engineers, Designers and Consultants

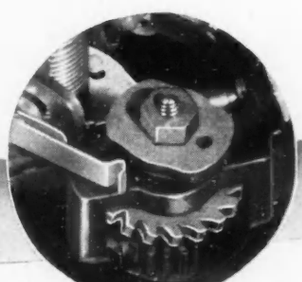
Distributors in U. S. and Possessions

AUTOMATIC ELECTRIC SALES CORPORATION, 1033 W. Van Buren St., Chicago 7, U. S. A.

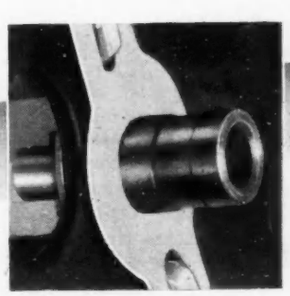
Export Distributors: INTERNATIONAL AUTOMATIC ELECTRIC CORPORATION



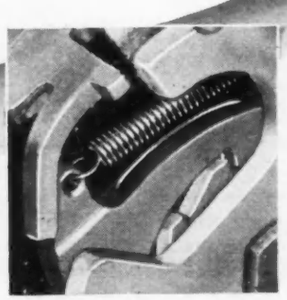
Fiber inserts in governor provide positive speed control, with negligible wear.



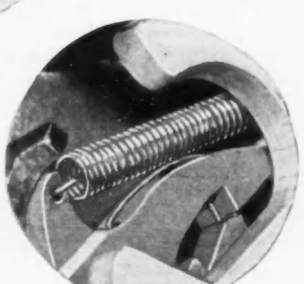
Special laminated pinion is self-lubricating, non-sticking, long-wearing.



Extra-long main bearing prevents side-play, minimizes wear.



Positive pawl-lock prevents dial over-running at end of its operation.



Patented "quieted" pawl makes this the world's quietest commercial dial.

Legal News of COURTS and COMMISSIONS

Lincoln Tel. & Tel. Purchases Exchange

The Lincoln (Neb.) Telephone & Telegraph Co. has purchased the controlling stock of the Pawnee Telephone Co. of Pawnee City, Nebraska. At the time of sale, 31 stockholders held the bulk of the 1166 shares, and the Lincoln company has offered to purchase remaining shares. The sellers would have the benefit of liquidating dividend, which, with the premium offered for the stock, would represent about $9 bonus per share.

Court Order Closes Exchange

The Milton (Ia.) switchboard, up till now operated by Middle States Utilities Co. of Plattesburg, Mo., has been closed under court order, leaving the town with only one switchboard for long distance emergency use. Action arose when Middle States announced the necessity of rate increases of $1.76 to $3.81 for residential service and from $2.34 to $5.56 for business phones, and when the increase became effective on December 1, 1945, many subscribers discontinued service.

The Farmers and Merchants Telephone Company was organized last spring, and Milton voters granted a franchise to the new company, which Middle States did not have. The court order then ordered Middle States out of Milton, on the grounds that the company did not have a franchise to operate in the town. No stock has been issued for the new company as yet, but there have been numerous pledges of $25 per share.

Meanwhile, the new company is endeavoring to purchase equipment with which to commence operation, and the general consensus of opinion seems to be that there probably hasn't been a similar situation anywhere in the nation.

Wisconsin Commission Orders Abandonment of Areas

On July 18 the Wisconsin Public Service Commission authorized the abandonment of telephone lines belonging to eight separate telephone companies serving the northwest section of Rock County and part of Dane and Lafayette counties as soon as the Wisconsin Telephone Company can take over the lines and facilities.

Firms affected are the Union (Wis.) Telephone Co.; Jug Prairie Telephone Co., towns of Magnolia and Albany; August Ringhand Telephone Co., town of Union; County Line Mutual Telephone Co. and Liberty Creek Telephone Co., Union and Brooklyn (Dane County); Wiota-Northwestern Telephone Co., Gratiot; Dunphy-Tierney Telephone Co., Union and Magnolia; and the Pleasant Prairie Telephone Co., Union.

Request to Affiliate

The Wisconsin public service commission announced that it will investigate the recent application of Charles K. Chapman and 15 other owners and subscribers to abandon the Lovette Branch Telephone Co. near Darlington.

The company is served out of the Darlington exchange of the Wisconsin Telephone Co. The owners are asking to abandon the Lovette Company and become rural subscribers of the Wisconsin Telephone Co.

Rate Increase Granted

The Denmark (Wis.) Farmers and Merchants Telephone Co., was authorized by the state public service commission today to increase quarterly rates to its 292 subscribers from $5.25 to $6, but the commission refused the company's request for an additional charge for handset telephones.

Improvements Planned

The Central Iowa Telephone Co., Cedar Rapids, Ia., is entering upon an improvement program which includes the erection of new fireproof buildings in Manchester, Hopkintin, Greeley, Ryan and Lamont. Orders have been placed for the installation of an automatic dial system for Manchester.

Incorporation Articles Filed

The new Greenfield (Ia.) Telephone Co., with Edward S. Snethen, president, Isaac Molln, vice-president, and Frank Gatch, secretary-treasurer, has filed articles of incorporation with the Iowa secretary of state.

Directors of the new company who will serve until the first annual meeting the first Tuesday in June, 1947 are: W. H. Daubendiek, West Bend, Iowa; Edward S. Snethen, Fontanelle; Isaac Molln, Frank Gatch, Henry Buchholz, Greenfield.

The authorized capital stock of the corporation is divided into two classes, 40,000 shares of no par value common stock which shall be sold for not less than $1.00 per share, and 1500 shares of preferred stock of the par value of $40.00 per share, which shall be 4 per cent cumulative. Each share of common stock shall be entitled to one vote. The holders of the preferred stock shall not be entitled to vote.

The board of directors shall have the power to retire any preferred stock at any time upon payment of all dividends that have accrued thereon to the date of retirement and to issue either common or preferred stock in lieu thereof.

The officers of the company shall serve for a term of one year and shall be elected by the stockholders of the corporation.

The certificate of incorporation is issued for 20 years.

20 Years' Wire Taxes Claimed from A.T.&T.

State Treasurer of Delaware Jesse S. Cooper revealed July 16 that he has requested Attorney General J. Clair Killoran to institute suit against the American Telephone and Telegraph Company for $138,489 representing the unpaid wire mileage tax in Delaware for a twenty-year period.

Mr. Cooper gave the attorney-general a detailed account of the taxes due from 1927 through 1946 and in his letter accompanying the statement Mr. Cooper said:

"The company has in each year of this period of years contended the State of Delaware tax, in its case, is in violation of the provisions of the United States Constitution in that it constitutes a limitation upon or a regulation of inter-state commerce and hence a burden upon such commerce.

"For the last twenty years it has been the practice of each State Treasurer to file this annual objection of the American Telephone and Telegraph Company with the Attorney General. Nevertheless, no formal action has ever been taken by the State to enforce the collection of this tax or to obtain a decision as to the constitutionality of the law in question.

"In my opinion twenty years is too long a period to permit a matter like this to lie without decision. I believe that a court decision should be obtained. If our law is constitutional, the company should, and I believe will, pay the tax. If the law is unconstitutional, the company should be absolved of this tax liability and be relieved of the necessity of filing this return."

The tax is sixty cents a mile for the longest wire in the State, thirty cents a mile for the next longest wire and twenty cents a mile for all other wires.

Exchange Changes Owners

The Richmond (Wis.) Telephone Co., which has been managed for stockholders by Paul Scharine since 1920, has passed into the hands of the Donald Clark family. The officials of the new Richmond Telephone Co. are Donald Clark, president; Grace Oelschlager, vice-president; Ruth Clark, secretary-treasurer. A new building is being erected and when phones become available the company will serve about 120 subscribers.

Ask Rate Increase

The Norwalk (Wisc.) Independent Telephone Co. has applied to its public service commission to increase rates.

Install Dial System

The Southern Continental Telephone Co., Cookesville, Tenn., has received permission from its railroad and public utilities commission to install dial system at Monterey. The commission has also ordered the company to install an additional Monterey-Cookesville toll circuit and a direct Monterey-Crossville toll circuit.

Rates ranging from $2.75 a month to $4.75 a month were approved by the commission for the new Monterey service when installation is complete.

Withhold Decision

The Florida Railroad Commission has withheld final decision in the matter of the Farmers Telephone Co. at Lockhart. The Winter Park Telephone Co. has offered to buy the interest in the Farmers company held by Douglas Burnett, Jr., present claimant, and restore adequate service. Subscribers are asking for reliable service that will include direct local service free of toll charges for Orlando calls.

New Owner

The Knapp Telephone Co., operating in Cokato and French Lake Townships, Wright County, Minn., has been authorized to sell all of its telephone properties to James J. Schultz.

Cable Laying in Worthington

Worthington (Minn.) Telephone Exchange Co. is laying 12,000 feet of underground cable; with 30,000 feet on order and still to be received.

Buys Properties

The Alexandria, Minn., Telephone Co. has received permission from the railroad and warehouse commission to purchase the Nelson telephone exchange from Leland Wright and Associates.

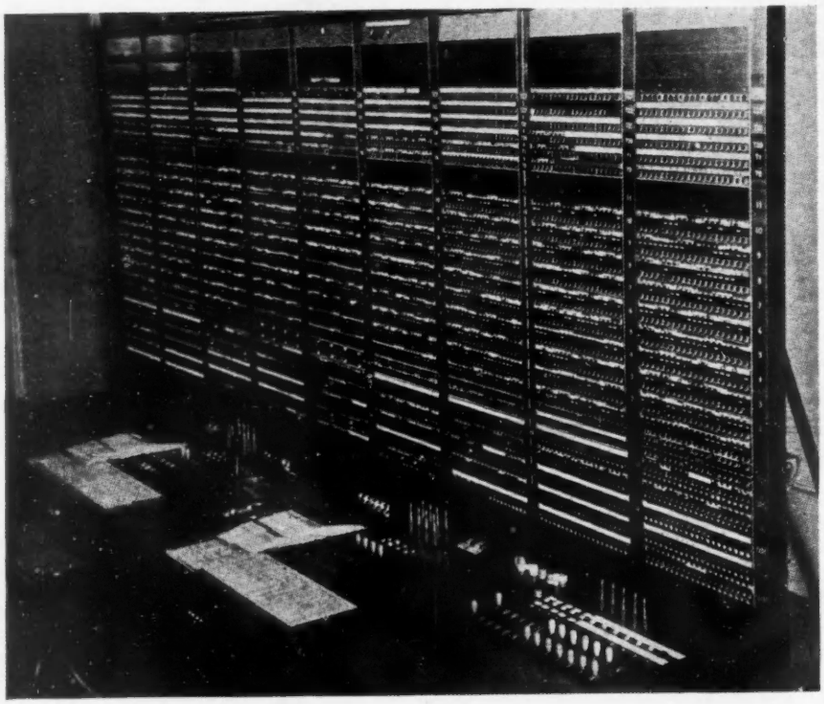
Request New Rates

The Beef River Valley Telephone Co., serving Osseo, Wisc., and the Alliance Telephone Co., serving Minong, have applied to the commission for rate increases.

Subscribers Petition for Dial

The Hector (Minn.) Telephone Co. has received a petition from residents of Cosmos and surrounding rural areas for the installation of dial equipment. To date the Cosmos community has been served by multi-party lines in the village of Cosmos as well as surrounding rural area. Accordingly, the Hector company has petitioned the Minnesota Railroad and Warehouse Commission for permission to install an exchange at Cosmos.

"If a few shells were coming over and the Colonel was yelling for 'another mile of wire' . . . I'd feel right at home!"



A Picture Training Switchboard

Some use is being made by Bell System companies of photographic training units, for the training of operators. These units consist essentially of a large photograph of the face equipment of a typical maximum size manual board. The master photograph, which consists of several pieced together enlargements of smaller photographs is mounted on masonite and is of such size as to be exactly like the face equipment on the regular switchboard. It is mounted on a key shelf of one or more student positions which have regular cords and keys. A small number of answering jacks and lamps and multiple jacks are provided in the picture face by individual mountings. This permits sample calls to be answered and completed and the unit offers the advantage of giving the feeling of a regular switchboard without the expense of providing a full multiple and set of answering jacks in the several student's training positions. A view of the photographic unit is shown above. This unit is being used in the Pittsburgh area of the Bell System.

Crystal Detectors Again in Style

Any telephone man that has been interested in radio over a period of years will recall the early Galena crystal detector days in which a simple coil wound on a Quaker Oats box, a capacitor and a Galena crystal were used to hear KDKA at Pittsburg. The development of the vacuum tube and the loud speaker quickly pushed the crystal detector and headphones out of the picture and until World War II crystal detectors were practically unheard of. The wartime development of radar and other microwave units created a need for a simple element which would rectify the exceptionally high frequencies used in microwave work. Surprisingly, it was our old friend, the crystal detector that was found best suited for this job. It was resurrected and today occupies an important place in microwave techniques.

But the present day crystal detectors are a far cry from the early cat-whisker galena type in which constant adjustment was required to find a sensitive surface on the crystal. Present day crystals are composed of silicon, aluminum and germanium in various combinations. Millions of these crystals were used during the war. The new crystal detector has the advantage over vacuum tube detectors of taking up less space, of being more stable and less expensive, and of working well at microwave frequencies.

New Type Crystal

Crystals of this type are also being used in radio systems of the type that are being tried out as a substitute for long distance telephone lines.

The modern crystal detector has a fixed "whisker" which bears firmly on the crystal face and the whole assembly is small, compact and completely enclosed. These crystal rectifiers are used as detectors of microwaves; for mixers in microwave converters; and in some cases as a low frequency rectifier.

These crystals are often used directly across the input circuit from the receiving antenna of a microwave system. According to one writer, a modern crystal used in conjunction with a locally generated frequency, can detect microwave signals as low as 10^{-15} watts of power.

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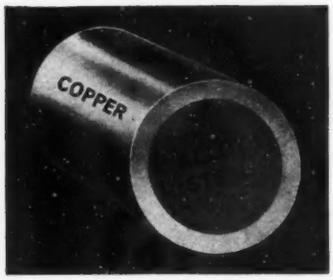
longer spans, better conductivity, and lower maintenance with

copperweld!



Pliable, easily handled, light in weight, economical in cost —only Copperweld combines the high strength and ruggedness of steel with the conductivity and permanence of copper.

Copperweld has the best electrical conductance of any high-strength conductor—is 2 to 3 times stronger than hard-drawn copper wire—has greater tensile strength than any wire of comparable properties.

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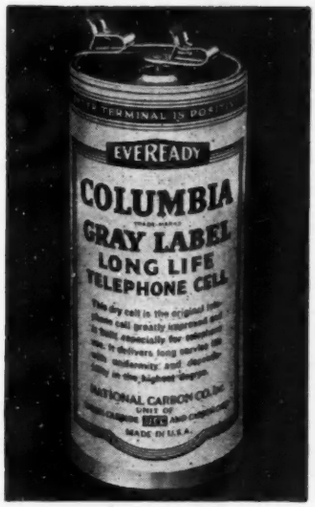
Made by the makers of the famous "Eveready Air Cell" Operators' Transmitter Batteries.



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prevent overtension with the dillon dynamometer!

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Neither heat, cold, nor accidental overload affect the accuracy of its readings. It may be used in any position, with the load applied from any angle. It permits immediate readings on the job, with a minimum amount of time and trouble.

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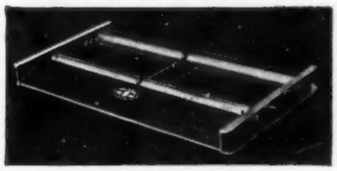

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For two reels 24" wide, or one reel 48" wide.

Also available in Style "A" for single reels up to 28" wide

Heavy reels of wire, cable, steel strand, or rope can be dispensed with amazing rapidity, safety, and convenience from Roll-A-Reel. Heavy, adjustable ball-bearing rollers provide friction-free reeling despite variations in reel diameter. Simple, toe-operated spring lock makes reel removal easy. Reel may be dispensed from front or back, top or bottom.

- Heavy gauge steel frame, capacity 4,000 lbs.
- Two independent sets of rigidly aligned ball-bearing rollers, with separate toe-operated spring lock for each, make reel removal easy.
- Low, slanted front for easy loading or unloading; no jacks or other troublesome devices necessary.
- Width 52", depth 28", height 4", weight 110 lbs.
- Simple, sturdy, light-weight. Stands upright in any end position for safety and convenience.
- Built for years of service.

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STROMBERG Telephone CARLSON

LINE and DESK

Edited By
J. S. REED, JR.

Minimum Required Clearances of Inside Wires and Inside Wiring Cable from Foreign Wires, Conduit and Pipes

From Nearest Part of	Clearances Crossing	Paralleling
Knob and tube electric light wiring	2" (Note 1)	2"
Signaling circuits such as door bell and electric door lock	½"	½"
Electric conduit of all types (Rigid, BX cable, non-metallic cable, etc.)	½"	½"
Radio antenna lead, ground wire, loudspeaker lead	6"	6"
Over water pipes; over and under uncovered steam pipes (Note 2)	½"	½"
Under water pipes	Note 3	do not parallel

Notes:
1. If there is any possibility of the wires coming together closer than 2 inches when crossing each other, protect the inside wire with loom.
2. No protection is required for runs passing closer than ½ inch from covered steam pipes.
3. If crossing under water pipe cannot be avoided, protect the inside wire with loom regardless of amount of clearance; since water pipes tend to sweat and would drip moisture on the wire.

Q. What should be the clearances of inside wire from other wires and conduit inside a building?

A. We recommend minimum clearances as shown in the accompanying table.

Q. What procedure would you recommend to preserve body belts and safety straps?

A. Linemen's body belts and safety straps need cleaning and dressing with saddle soap about four times a year or oftener if the leather frequently becomes soaked with perspiration or these articles are used quite often during wet weather. In addition, neatsfoot oil should be applied to the leather at least twice a year to keep it soft and pliable.

To clean and dress the body belt and safety strap, first wipe off loose dirt from these items with a damp, though not wet, sponge. Rinse out the sponge, squeeze out as much moisture as possible, and rub it with a mild, alkali-free soap to produce a thick lather. Rub the leather with the lathered sponge to remove perspiration and adhering dirt, and wipe off excess moisture with a clean rag. Again rinse out the sponge, squeeze it as nearly dry as possible, and apply saddle soap to work up a lather. Rub all parts of the belt and strap with the sponge until the saddle soap is well worked into the leather. Set these items aside in a shady place until dry and then rub the leather well with a soft rag.

When it becomes necessary to use oil on the leather, do this only after cleaning with mild soap and before the belt and strap have dried; since applying the oil to dirty or dry leather may cause this material to deteriorate. Use only a small amount of neatsfoot oil, (never machine oil or vaseline) just enough to spread on, and work into the leather with the hands without giving the leather a greasy appearance. (If too much oil is used, the leather will stretch and tend to pick up sand and grit that may damage the material.) Let the belt and strap dry slowly in a shady place for at least a day after which rub the leather well with a soft dry rag to remove surplus oil.

Q. What sizes of linemen's climbers are obtainable and how is the proper size determined?

Fig. 1—Showing method of determining size of linemen's climbers.

A. Linemen's climbers can be obtained from manufacturers or jobbers in sizes ranging from 14 inches to 19 inches in ½ inch steps, viz., 14", 14½", 15", 15½", etc., representing the length of the climber from the instep to the end of the shank as shown in Figure 1. (Stock sizes ordinarily are 15" to 18".) To obtain the correct

(Please turn to page 74)

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Light Service Body

MODEL 2050

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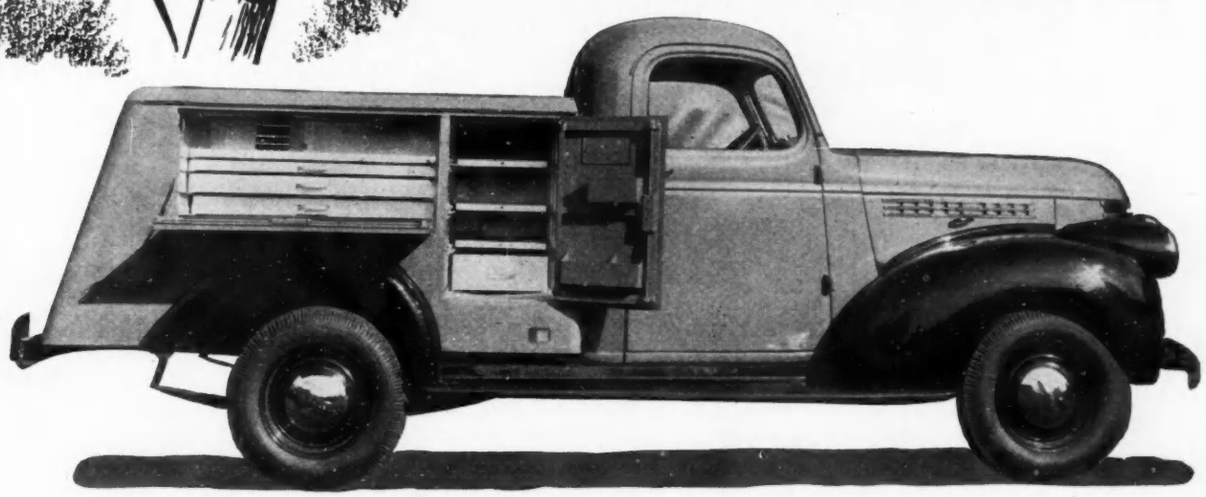

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DESIGN . . . compact and convenient with specific compartments for correct tools, parts, and materials for efficient service work.

ADAPTABILITY . . . bodies can be serviced and remounted from one conventional ½ ton chassis to another.

CONSTRUCTION . . . all-metal construction with reduced body weight provides "take it" ability that assures constant trouble-free operation.

Be "Body-Wise" . . . Consult US.

BODY DIVISION

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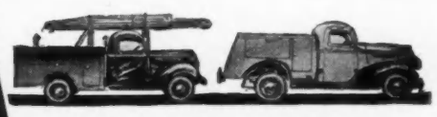

YORK, PENNSYLVANIA

PUBLIC THANKS FOR PUBLIC SERVICE

On the opposite page is a tribute to telephone service representatives everywhere. These days they are busier than ever before.

The advertisement will appear in August national magazines. It should help to increase public understanding and appreciation of the big job being done by telephone people all through the industry.

An advertisement of the BELL TELEPHONE SYSTEM

SERVICE REPRESENTATIVE *in the Business Office. She's there to help whenever you have questions about service, equipment or bills. An important part of her job is to see that all orders are filled in their proper turn.*

Speaking of Citations

Next time you call or visit a telephone office, see if you don't think the young women working there deserve a citation for competence and courtesy. They are doing a fine job.

Demand for telephone service is at an all-time high. That means more calls to put through—more telephones to install—more bills to prepare and send out—more people to talk with in the business office . . . and more equipment needed to do the job the way we would like to do it.

We're building and adding just as fast as we can get materials and make equipment. In the meanwhile, telephone people who serve you will keep right on doing their best.

And doing it with a friendly smile.

BELL TELEPHONE SYSTEM

3 SPECIAL issues at your service

FALL CONSTRUCTION and NEW PRODUCTS Issue

The entire editorial staff of TELEPHONE ENGINEER & MANAGEMENT . . . plus . . . several telephone engineers on an assignment basis are now preparing special articles on fall construction and wintertime practices for the big September 15 issue.

At the request of a number of leading manufacturers serving the industry an extra section devoted to **New Products** will be featured. This will be one of the most interesting issues of the year.

PRE-CONVENTION Issue

October 1, FORTNIGHTLY TELEPHONE ENGINEER will be chock-full of information on the coming 49th Annual Convention of the United States Independent Telephone Association. Official Program—Pictures of Speakers—Invitations to exhibits, etc., etc.

Over 2,500 expected. Advance hotel reservations indicate the attendance at the Annual Convention to be held at the Stevens Hotel in Chicago, October 14-15-16, will be larger than any such affair ever held by telephone men. Come prepared to spend the full three days and get the full benefit of the special program being arranged. **You'll also want to see the exhibits of the manufacturers.**

U. S. I. T. A. CONVENTION Issue

TELEPHONE ENGINEER'S Convention issue, October 15, will carry the convention in print to those unable to attend as well as serve as a record of happenings for those being present. TELEPHONE ENGINEER'S candid camera will furnish scores of pictures taken at the meeting for this issue . . .

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Dear Sir:

I would like, at the conclusion of the "Radio Course for Telephone Men", to express my appreciation to the Telephone Engineer for this splendid presentation of the radiotelephone problem. As we, on the Rock Island, have many carrier circuits in use, both telephone and telegraph as well as radio, it has been a real help in giving me a working knowledge of carrier circuit principles. Although I have completed the course, I realize there is much more there than I have learned.

Yours very truly,
Loren D. Ackley
Joliet, Ill.

◆

Dear Sir:

Attached you will find a recent development of the Mountain States Tel. & Tel. Co., an easily transported post-hole digger suitable for rural areas where it is not practicable to supply large equipment. The new experiment is operated by button controlled gas engine, auger can be lowered and raised at will while auger is in motion.

Any ideas I might have in the way of pictures from now on I will be glad to send on to you.

Yours very truly,
A. R. Bowen
Mountain States Tel. & Tel. Co.
Denver, Colo.

✦

Dear Sir:

I am sorry to see your radio course close. My hat goes off to Mr. B. C. Burden, the author and producer of this wonderful work. Kindly convey to him, if it is possible, my personal thanks for giving me the opportunity of being one of his students.

F. J. Seekircher
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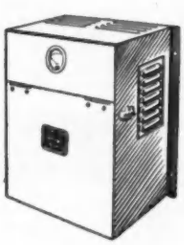

BATTERY CHARGERS – Graybar distributes copper-oxide, selenium, and tungar battery chargers – products of General Electric and Raytheon.

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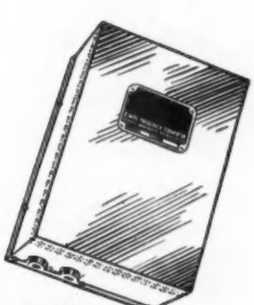

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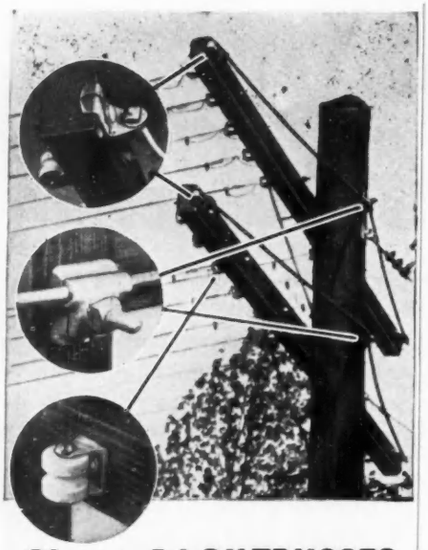

Chance BACK TRUSSES relieve cross arm strain Chance back trusses and terminal brackets put the dead-end load where it belongs and add years to the life of cross arms. Lines dead-ended on pins exert a heavy twisting strain on the arm and in a surprisingly short time the arm has to be replaced. With the Chance back truss method lines are dead-ended on terminal brackets mounted on the face of the arm. The load is evenly distributed and pulls directly against the steel truss. Most of the installation job can be done on the ground.

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Electronic Power Supply Circuits

(Continued from page 31)

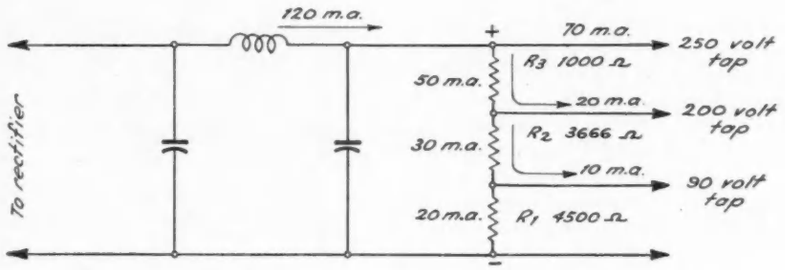

Fig. 25—Illustration of Voltage Divider Design.

stand the rectified peak voltage pressed across them (usually 450 volts ratings). Capacitances are usually 8 to 16 m.f. Choke coils are rated according to the amount of current they can safely handle and may be as small as 30 milliamperes for a small power supply system to as much as 500 milliamperes for a large one. Fig. 22 shows typical components used in modern filter systems.

The Voltage Divider

Most power supply systems usually make use of a voltage divider network across the output. This network may be a part of the electronic system supplied by the power supply unit or it may be a well defined part of the power unit itself. It serves the dual purpose of furnishing several voltages of different values and of providing a definite

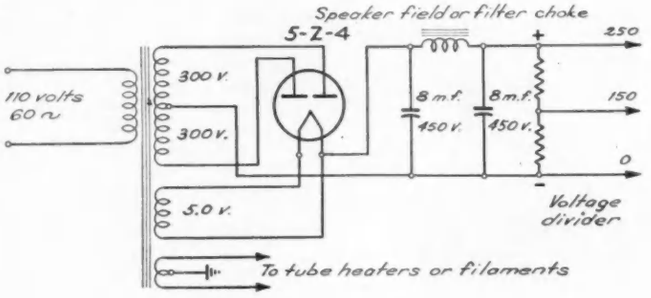

Fig. 26—a—Single Section Capacitor Input Type Power Supply System.

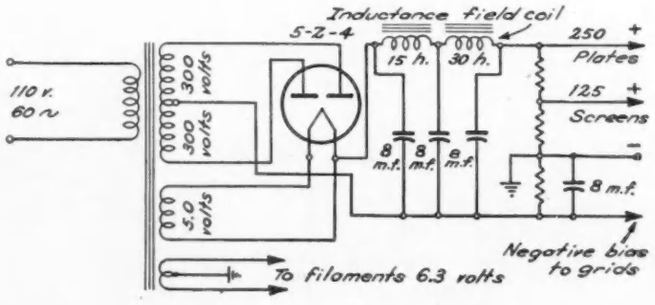

Fig. 26-b—Two Section Capacitor Input Type Power Supply System with arrangement for supplying Negative Bias to Tube Grids.

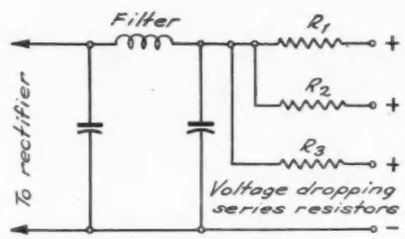

Fig. 23—Use of Series Dropping Resistors to Obtain Different Voltages in an Electronic Unit.

load resistance across the filter system output.

The problem of reducing the output voltage of a power supply system to lower values for the various plate screen and grid voltages required in the average electronic circuit can be met by use of either *series dropping resistors* as shown in Fig. 23 or by means of the *voltage divider principle* shown in Fig. 24. The latter method is preferable to the series resistance method for most purposes as it results in better overall voltage regulation.

In typical electronic circuits as for example radio sets, both methods are employed, i.e., basic voltages are supplied to various parts of the electronic circuit by means of the voltage divider principle and then a resistance is used to drop this voltage to a still lower value for a particular tube.

The so-called *bleeder current* drawn from a power supply system by a voltage divider tends to stabilize its action and to lower the high peak voltages to which capacitors would otherwise charge. The lower the bleeder resistance the lower will be the series resistance path through which the various voltage taps will operate.

Voltage Divider Design

The design of a voltage divider network is relatively simple, yet must be handled in the proper order to avoid error. The following example illustrates how a typical voltage divider network would be computed. Assume

(Turn page please)

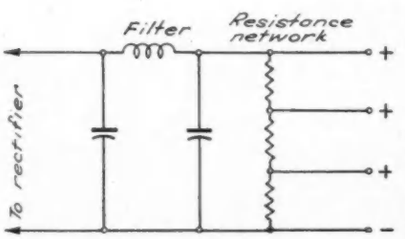

Fig. 24—The Voltage Divider Principle Used to Obtain Different Voltages.

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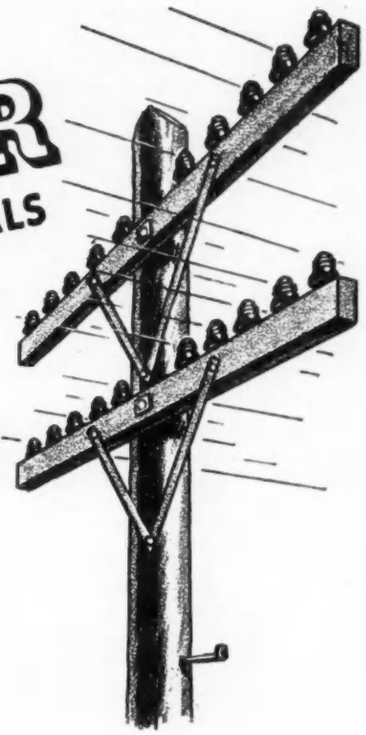

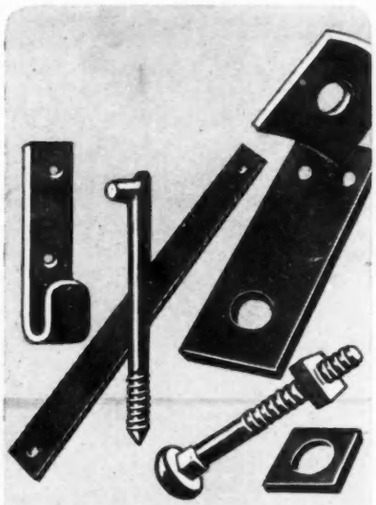

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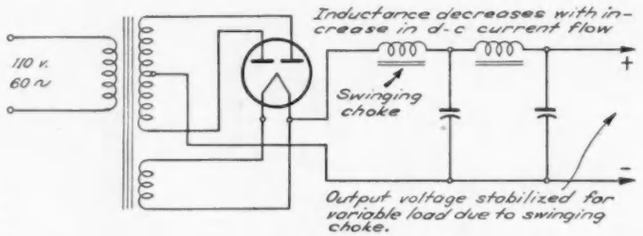

Inductance decreases with increase in d-c current flow
110 v. 60 ~
Swinging choke
+
-
Output voltage stabilized for variable load due to swinging choke.

Fig. 27—Circuit for Improving Voltage Regulation nsing a Swinging Choke.

requirements at the output of the filter system as follows:

Tap No. 1—250 volts at 70 m.a.
2—200 volts at 20 m.a.
3— 90 volts at 10 m.a.

In view of a total load demand of 100 milliamperes a bleeder current of 20 milliamperes is selected. Bleeder current is normally set at from 15 to 20 percent of total load current. By using a relatively high bleeder current the voltage regulation on the several taps is improved. The values of the several bleeder resistors can be computed as follows:

Step 1—The value of resistor R_1 (see Fig. 25) would be determined (Ohm's Law) by dividing the voltage drop desired between the negative terminal and the first tap (90 volts) by the current flowing through this section of the network. In this case, this would be only the bleeder current, i.e.,

$$R_1 = \frac{E}{I} = \frac{90}{.02} = 4500 \text{ ohms}$$

Resistor R_2 will carry 30 milliamperes (20 bleeder plus 10 load) and the voltage desired between the negative terminal and tap No. 2 is 200 volts. Inasmuch as the voltage drop across resistor R_1 is 90 volts we would need a drop of 110 volts across resistor R_2; therefore.

$$R_2 = \frac{E_2}{I_2} = \frac{110}{.03} = 3666 \text{ ohms}$$

The final resistor R_3 would be required to carry 50 milliamperes (20 bleeder plus 30 load) and a 50 volt drop across resistor R_3 would be required; therefore,

$$R_3 = \frac{E_3}{I_3} = \frac{50}{.05} = 1000 \text{ ohms}$$

The three resistors connected in series will give voltages at the current ratings required.

Power Rating of Resistors

The resistors used in a voltage divider must have adequate power handling capacity to avoid over-heating on the bleeder current which they pass. The power which they are called on to handle is found by the formula:

$$P = I^2R$$

For example resistor R_1 in the typical case just given would be required to handle:

$$P_1 = .02^2 \times 4500 = 1.8 \text{ watts}$$

Hence, a five watt resistor would be more than adequate for this particular unit.

Practical Power Supply Circuits

Complete power supply systems in addition to supplying the rectified direct current for plate and screen voltages also furnishes low voltage a-c for the filaments and heaters of the various tubes and pilot lights. Fig. 26 shows several typical complete power systems of the types commonly encountered in practice.

Regulated Power Supplies

When exceptionally stable voltages are required from a power supply system, special arrangements are used to keep the voltage constant regardless of changes in load current. The method shown in Fig. 27 makes use of what is known as a *swinging choke*. This is merely an inductance which is operated near its magnetic saturation point. As the load increases the direct current flowing through it reduces its inductance, thus permitting a higher charging current to flow into the first capacitor thus increasing its top voltage, never, an increase in the output voltage. The increase is sufficient to offset the loss in voltage due to the various voltage drops in the filter and rectifier components.

Low Discharge Regulator Tubes

Another popular method of providing a stable d-c output voltage from a power supply system is to use a *glow discharge tube* in a circuit as shown in Fig. 28. These tubes consist of two elements, i.e., a cathode and an anode in an evacuated glass bulb filled with an inert gas.

This tube has the characteristic of maintaining a constant voltage across the tube terminals over a fairly wide range of load current. In operation, the filter output voltage is impressed across the cathode and anode. This ionizes the gas in the tube and it draws current. This current flows through a series dropping resistor and the voltage drop across the resistor compensates for the changes in filter output voltage. As the filter output voltage drops, due to increased load current, the current taken by the glow discharge tube decreases and the reduced I R drop in the dropping resistor offsets the voltage increase.

(To be Concluded Next Issue)

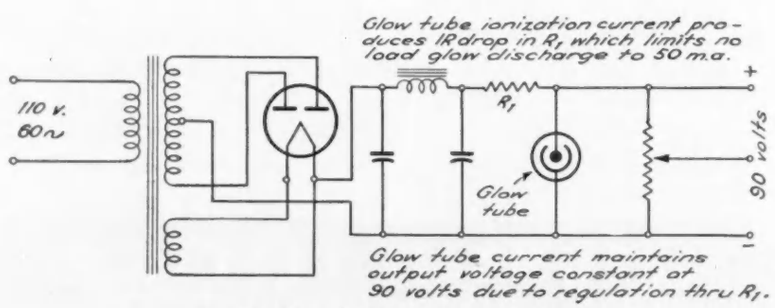

Glow tube ionization current produces IR drop in R1 which limits no load glow discharge to 50 m.a.
110 v. 60 ~
R1
+
-
90 volts
Glow tube
Glow tube current maintains output voltage constant at 90 volts due to regulation thru R1.

Fig. 28—Use of Glow Tube as Voltage Regulator.

Efficient Plant Training Programs

Bell System companies throughout the nation have instituted comprehensive plant training programs designed to train the new people that will be needed in the extensive plant expansion and service improvement plans of the Bell System. Centralized schools having programs which range from one to ten weeks in length are being used to give training in the following types of plant work:

1.—Line and cable construction
2.—Cable splicing
3.—Station installation
4.—Station repair
5.—Key telephone systems
6.—P.B.X. installation and maintenance.
7.—Community dial office maintenance
8.—Small manual office maintenance
9.—Step-by-step switchman training

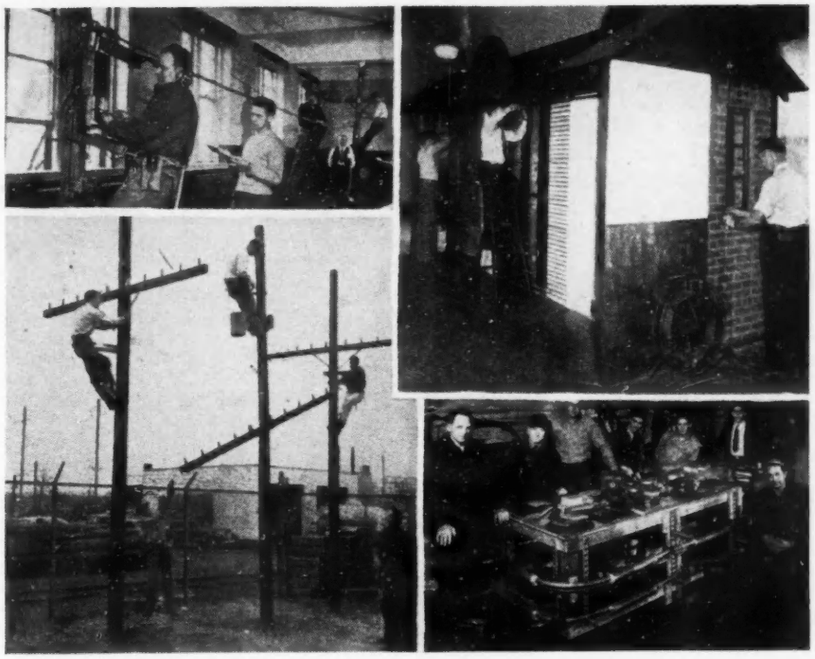


Fig. 1—Mock-ups for Employee Training Program

10.—Teletypewriter training

11.—Carrier telephone systems.

The instructors are for the most part supervisors experienced in the various specialized phases of telephone work being taught and have had some teaching experience. Instruction makes use of moving pictures and slides as well as actual work on dummy poles and equipment. The basic theory and plant procedures are easily and rapidly taught by this combination of theory and practical work. Special stress is laid on accident prevention practices during the training work.

In addition to the regular training program, supplementary classes are held for supervisors. These serve to refresh men who have been in the armed services as well as to bring new information to all supervisory personnel. The supervisory training program includes such subjects as: (1)—Vocational instructor training, (2)—Plant accounting and field reporting practices, (3)—Accident prevention including the safety observation plan, (4)—Human relations and (5)—Job responsibilities.

Fig. 1 illustrates some of the "mock-ups" which permits the rapid training of new men in such work as cable plant, subset installations, pole line work, cable splicing, and the many other phases of plant work.

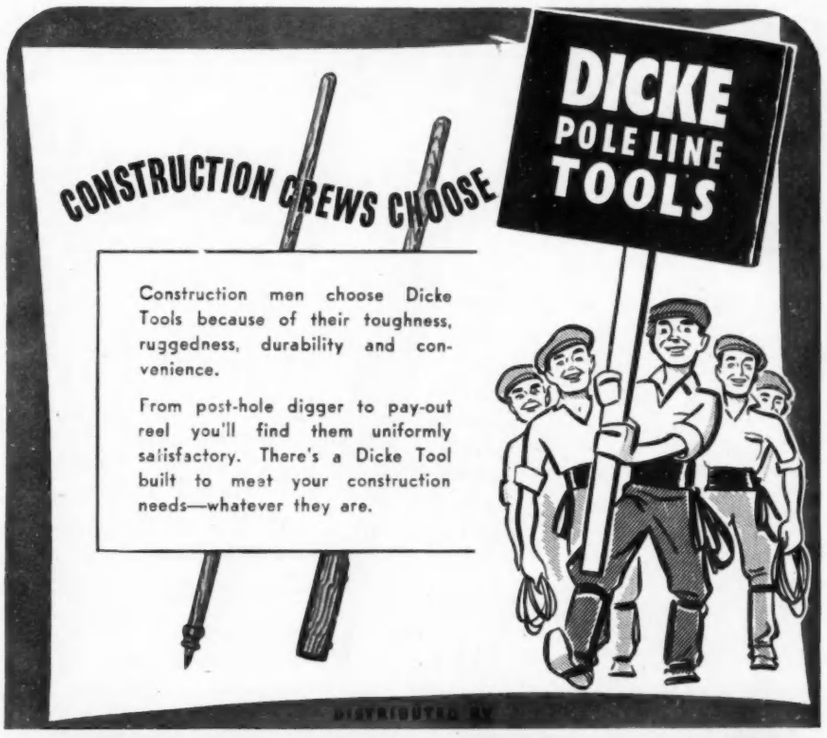
✦

With no telephone directories issued in the last six years in Paris, France, new editions are now being delivered, the 1,064-page volume using thinner paper than pre-war editions and being bound in heavy paper rather than cardboard.

Two New Members

The Moultrie County Telephone Co., Lovington, Ill., and the 4-C Telephone Co. at Rankin have enrolled as new members of the Illinois Telephone Association.

SINCE 1889
NATCO
CLAY CONDUIT
The proved and standard Protection for Underground Telephone Cables.
Cheapest in the long run. Highest quality and a full line of shapes.
National Fireproofing Corp.
202 E. Ohio Street, N. S.
PITTSBURGH, PA.


CONSTRUCTION CREWS CHOOSE
DICKE POLE LINE TOOLS
Construction men choose Dicke Tools because of their toughness, ruggedness, durability and convenience.
From post-hole digger to pay-out reel you'll find them uniformly satisfactory. There's a Dicke Tool built to meet your construction needs—whatever they are.
DISTRIBUTED BY
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SALES CORPORATION
1033 WEST VAN BUREN STREET : CHICAGO 7, ILLINOIS

Missouri Holds District Meetings

(Continued from page 35)

11. Adjust transmitter horn properly.
12. Pass calls, orders and reports distinctly with stile-strip inflection.

Discussion on these points and their sub-items was led by Southwestern Bell Traffic men, and questions and participation from the audience proved the extent of interest. Toll ticket writing received much attention, with sample tickets prepared on "blow-ups" of actual tickets which were placed in full view of the audience. Writing of tickets on various types of calls, and covering many different circumstances were an essential part of each session.

Agreement was unanimous that the three District meetings were the most profitable of any held in years before the war. Tentative plans were announced by Secretary Hedrick for another district meeting in Western Missouri, as well as for the State Convention of the Association in Jefferson City in November.

Wisconsin Group Delving Into New Wage-Hour Plan

The Wisconsin Industrial Commission is presently holding district meetings throughout the state on a proposed change in the minimum hourly wage rates to be paid female employees, according to J. E. Byrne of the Wisconsin State Telephone Ass'n.

A hearing on the proposal was scheduled to be heard by the Industrial Commission August 5 at Madison and the Wisconsin association group planned to attend in a body to protest the plan which calls for an upping of minimum wage rates. The Industrial Commission plans to increase minimum wage rates for women working in communities within the industrial and commercial areas adjacent to cities and villages with populations of 3,500 or more to 45c per hour.

If this regulation becomes effective it will nullify the provision under the Federal Fair Labor Standards Act (Wage-Hour Law) which exempts operators in telephone exchanges serving fewer than 500 stations from the 40c present minimum rate and will make it impossible for hundreds of small Wisconsin telephone companies to survive without substantial increases over present subscriber rates.

In informing his members of the hearing Mr. Byrne cited several examples of what this regulation would mean to typical small exchanges in the state. He told of one company with a total of 110 stations with a monthly rate of $1.50 per station or gross monthly receipts of $165.00. Under the proposed 40c minimum wage rate it would cost the company approximately $156.00 per month for its operator's wages and would leave a balance of $9.00 per month for maintenance, depreciation, taxes, supervision, insurance, return on investment, etc. "It simply cannot be done" said Mr. Byrne.

Illinois Association Picks 1947 Convention Dates

The 1947 annual convention of the Illinois Telephone Association has been set for April 24 and 25 at Hotel Pere Marquette. This date is considerably earlier in the year than is usual for the Illinois meeting and was occasioned by hotel facilities being unavailable for later in the year.

This announcement by J. G. Hardy, secretary of the association supercedes the previous announcement that the convention would be held during the month of May.

SAVE WIRE
SAVE TIME
SAVE TROUBLE

The Nicopress method creates a joint as strong as, or stronger than, the line itself. There's a complete line of Nicopress sleeves for repairs, dead-ends, take-offs, splices, and tools for each. These, plus many other Nicopress specialties for telephone lines, are famous for service.

THE NATIONAL TELEPHONE SUPPLY CO.

Repair with NICOPRESS SLEEVES

Now is a good time to cut out noisy, high-resistance joints, and replace with Nicopress Repair Sleeves. These long sleeves (7 to 10 inches long) span the length of the cut-out splice—make it unnecessary to splice in a new section of wire. Thus, you do the job in one operation instead of two —save wire, save time, save trouble.

Nicopress Repair Sleeves are shown in our big catalog of Telephone Supplies.

Order from

AUTOMATIC ELECTRIC SALES CORPORATION

1033 WEST VAN BUREN STREET • CHICAGO 7, ILLINOIS

FIELD TESTED!

In Operation Today

A 4000 megacycle two-way communication circuit has been in 24-hour-a-day operation between New York and Boston since August, 1945. The Raytheon equipment employed on this circuit has successfully met rigorous tests involving a wide variety of terrain and climatic conditions.

This equipment is available from Raytheon.

For detailed information, write for descriptive Bulletin DL-C-101.

RAYTHEON

Excellence in Electronics

RAYTHEON MANUFACTURING COMPANY

Microwave Communications Dept., Waltham 54, Mass.

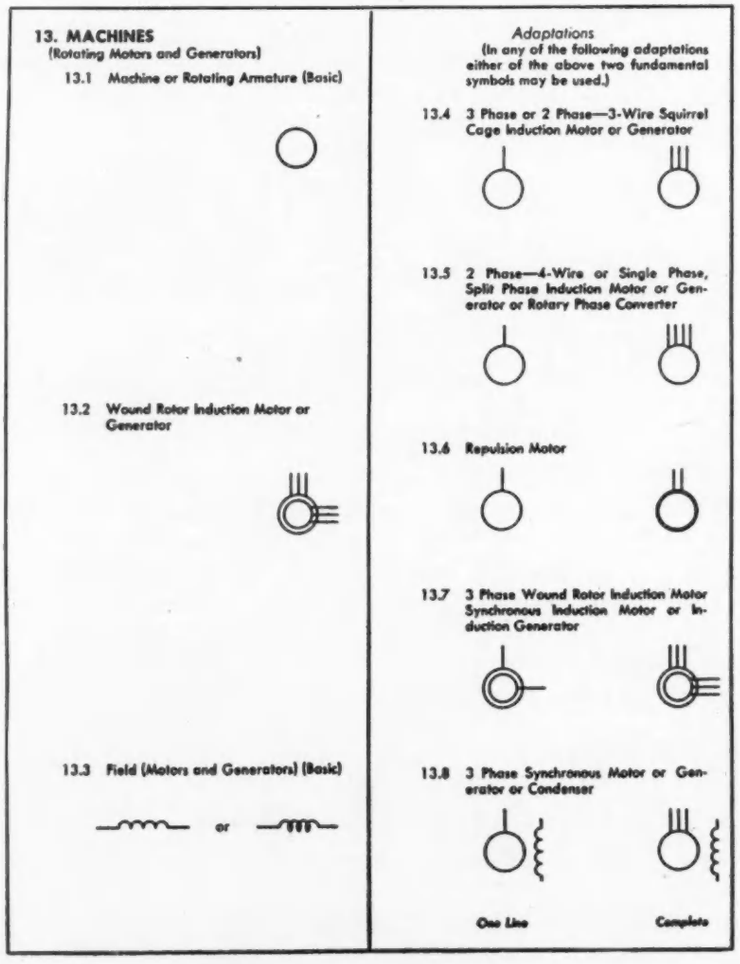
Coordinated Symbols

Used in New Edition of Graphical Symbols for Electric Power

Approval of the 1946 edition of American Standard Graphical Symbols for Electric Power and Control is one more step toward a unified system of graphical symbols for use on drawings

By W. L. Heard

Chairman, Sectional Committee on Graphical Symbols and Abbrevations for Use on Drawings; Systems Staff Engineer, Bell Telephone Laboratories


13. MACHINES
(Rotating Motors and Generators)
13.1 Machine or Rotating Armature (Basic)
13.2 Wound Rotor Induction Motor or Generator
13.3 Field (Motors and Generators) (Basic)
or
Adaptations
(In any of the following adaptations either of the above two fundamental symbols may be used.)
13.4 3 Phase or 2 Phase—3-Wire Squirrel Cage Induction Motor or Generator
13.5 2 Phase—4-Wire or Single Phase, Split Phase Induction Motor or Generator or Rotary Phase Converter
13.6 Repulsion Motor
13.7 3 Phase Wound Rotor Induction Motor Synchronous Induction Motor or Induction Generator
13.8 3 Phase Synchronous Motor or Generator or Condenser
One Line
Complete

NATIONAL standardization of graphical symbols for use on drawings has been going forward for many years, but progress towards the desirable ultimate goal of one general basic standard for all fields has been rather slow. This has been true because in the past the electrical endeavor has in general been divided into two large fields which have grown up almost independently of each other with very little overlapping of the use of drawings between them. The one field has to do with the distribution and use of electrical energy itself and is generally known by the term "Power", while the other is concerned with the transmission of electrical signals and is usually referred to as "Communications".

This divergence is also due, to some extent, to the different usages to which the apparatus is put in each field and to the different requirements which must be met in these separate fields. To illustrate, stray fields in communication necessitate accurate poling and placing of apparatus to prevent interference with the transmission of talking or signaling currents. This occurs because most of the communication circuits are of small amperage. This accurate poling is not required in power where the currents are usually heavy and small stray fields have no appreciable effect on the circuits.

War Standards Met War Needs

The war made it necessary to rush certain phases of standardization in order that industry could meet the requirements of production which engulfed it in the war period. During this time the general lines between power and communications became rather indistinct because of the different uses to which war needs put the transmission of electrical signals; in many cases, this transmission was merely a means of controlling power-driven appliances.

Also, with the advent of the war, the armed forces began to feel the need of further standardization of electrical symbols. They found that in the drawings they were receiving from the power field and from the communication field identical symbols frequently depicted entirely different devices and different symbols were often used for the same or similar devices. This was due to the fact that equipment was being manufactured wherever there might be facilities for it, and not in the usual channels of power or communication manufacture. This made it confusing for the armed forces inasmuch as they faced the necessity of training large numbers of new technicians and operators and the lack of uniformity in drawings was a serious drawback.

Industry Encountered Problem

The problem was also encountered by industry which found itself manufacturing the same basic equipment although required to furnish different drawings to different branches of the armed services. In addition, industries using electric equipment and electric components such as capacitors, resistors, etc., would receive drawings of apparatus of the same general description furnished by different manufacturers but using quite different symbols, depending upon the source of manufacture.

On April 18, 1944, therefore, the American War Standard Coordination of Electrical Graphical Symbols, Z32.11-1944, was issued as a wartime expedient to produce a standard for the war effort which would eliminate any direct conflicts within the two general divisions of industry. This has been found satisfactory as a means of lessening many of the difficulties met in depicting apparatus on drawings for the armed forces. For example, prior to the issuance of Z32.11-1944, —WW— in power would indicate a coil with a magnetic core, while in communications the same symbol indicated a

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Yes! Years more service with

TELEPRENE*

DROPWIRE

You can get added years of GOOD SERVICE at this vulnerable point in your plant by specifying Teleprene Drop Wire.

Teleprene is jacketed with Neoprene which is highly resistant to sunlight and weathering, abrasion and wear, high voltage, acid and chemicals, heat and flame.

The difference in cost, per drop, is **PENNIES,**
The difference in Life is **YEARS**

For other outstanding features of Teleprene see our bulletin *"The Story of Teleprene Drop Wire"*

TELEPRENE; the DROP WIRE with the NEOPRENE Outer Jacket

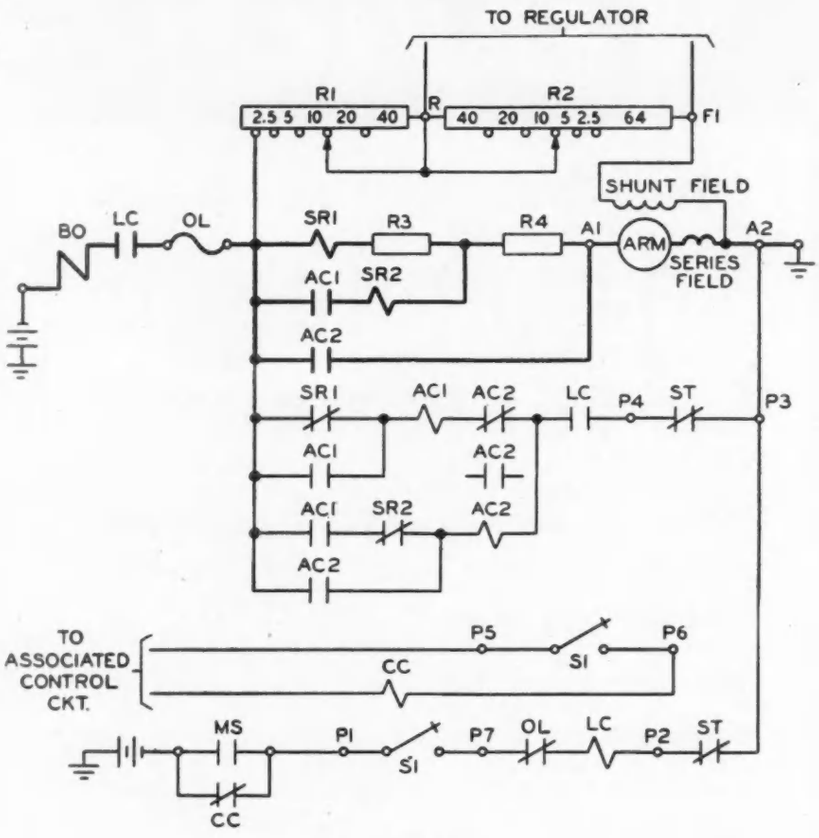
Prices, delivery and samples obtainable through your nearest GraybaR Office

Order Teleprene by WHITNEY BLAKE Catalogue No.
17TBP-R Reinforced Parallel
17TBP Parallel
17TB2-R Reinforced Twisted Pair
17TB2 Twisted Pair

* *Reg. Applied for, U.S. Pat. Office*

THE WHITNEY BLAKE CO.
New Haven, Conn.
Well Built wires since 1899

TYPICAL CONTROL CIRCUIT



LEGEND

AC1, AC2: ACCELERATING CONTACTOR
BO: BLOWOUT COIL
CC: CONTROL RELAY
LC: LINE CONTACTOR
MS: AUTOMATIC CONTROL CONTACT
R1-R2: FIELD RESISTORS
R3-R4. STARTING RESISTORS
S1 LOCAL STOP SWITCH
SR1, SR2: SERIES RELAY
ST: REMOTE MANUAL STOP SWITCH

resistor in the circuit. Also, —||— indicated an open contact in power, whereas on a communications drawing it would indicate a capacitor.

With the ending of the war, these symbols would have passed out of existence had they not been incorporated in the peacetime standards. American Standard Graphical Symbols for Electric Power and Control, Z32.3-1946, and American Standard Graphical Symbols for Telephone, Telegraph and Radio Use, Z32.5-1944. The new edition of the American Standard Graphical Symbols for Electric Power and Control, Z32.3-1946 incorporates the symbols suggested in the American War Standard Coordination of Electrical Graphical Symbols, with other minor revisions which have been made to bring the standard up to date with the general usage now being followed. This revised standard is now available for general distribution and use.

Work Shaping Up Towards Issuing One General Standard

In addition of the work now completed on symbols for power and communications, it is intended that other graphical symbols will be issued for use in electrical engineering. A proposed standard which will provide basic graphical symbols for all electric apparatus, Z32.12, is already in tentative form to be issued in the near future. When finally released, it will be used as a basis for separate standards for individual industries where it is believed a separate standard would be useful. At present we have issued or are ready to issue the following standards:

Graphical Symbols for Electric Power and Control, Z32.3-1946;
Graphical Symbols for Telephone, Telegraph and Radio Use, Z32.5-1944;
Graphical Electrical Symbols for Architectural Plans, Z32.9-1943;
Graphical Symbols for Electronic Devices, Z32.10-1944;
Basic Graphical Symbols for Electric Apparatus, Z32.12.

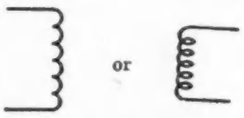
Objectives in Standardization of Symbols

The primary objectives in the development and coordination of these symbols is:

(a) To provide a uniform set of components and basic symbols from which symbols for complete devices can be evolved which will provide drawings easily followed during wiring;

(b) To make the depiction of apparatus as simple and clear-cut as possible, both from the viewpoint of drafting time required to draw them, and from their over-all appearance.

The published standards are of necessity always broad in scope and do not cover all possible combinations of symbols or components. It has also been necessary at this time to include some alternatives, although it is felt that general usage will in time make one or the other of these alternates obsolete. For example:



both indicate transformer or coil windings. It is hoped that ultimately one or the other of these alternates will be dropped out and that the remaining alternate will resolve itself into a single accepted symbol.

Future Standards

With the advent of peace and the return of peacetime production, it is still important that the work on these symbols does not remain static, and that we continue with our standization and improvement in order to hold and further the gains which we have already made through our past efforts. This is particularly important since the general fields of power and communication will continue to overlap in peacetime to almost as large an extent as they did during the war. For example, with the present outlook, rural electrification is taking a large place in the thinking of both government and industry. A carrier system whereby telephone service and electric power are provided to the rural subscriber at the same time over one transmission system is planned with this project.

One can further envision peacetime uses for many of the devices which have been developed during the war, particularly in the electronic

field, where great advances have been made during the past four or five years.

The Sectional Committee on Graphical Symbols for Use on Drawings, Z32, with a membership including technical, scientific, educational, governmental, and publication groups, is responsible for the standardization of graphical symbols. Seven standards have now been completed by this committee, which carries on its work under the sponsorship of the American Institute of Electrical Engineers and the American Society of Mechanical Engineers.

Members of the subcommittee that developed the new edition of the electric power and control symbols are:

H. H. Angel, Bethlehem Steel Company
L. Geenens, New York City Tunnel Authority
I. W. Gross, American Gas and Electric Company
A. E. Knowlton, McGraw-Hill Publishing Company
F. P. Kuhl, Consolidated Edison Company of New York, Inc.
L. A. Leatherman, Bell Telephone Laboratories, Inc.
G. S. Lunge, General Electric Company
H. P. Sleeper, Public Service Electric and Gas Company
C. P. West, Westinghouse Electric Corporation.

Copies of the American Standard Graphical Symbols for Electric Power and Control, Z32.3-1946, are now available at 40 cents each.

Marmon-Herrington Company Elects Four New Directors

Arthur W. Herrington, chairman of the board of directors of the Marmon-Herrington Company, Indianapolis, Indiana, has announced that David M. Klausmeyer, C. Alfred Campbell, Guy C. Dixon and Earl J. Breech were elected to the board of directors at a recent meeting of the stockholders of that company.

Mr. Klausmeyer recently joined Marmon-Herrington as president, after 22 years with the Chevrolet Division of General Motors Corporation. Both Mr. Campbell and Mr. Dixon have been associated with Marmon-Herrington for a number of years and are officers of the company, being vice president and treasurer respectively. Mr. Breech is general manager and treasurer of the Merz Engineering Company, Indianapolis, wholly-owned Marmon-Herrington subsidiary. All four men have been associated with the automotive industry virtually their entire lives.

The election of these four men increases to eight the number of members on the board of directors of the Marmon-Herrington Company. Other members are Arthur W. Herrington, Chairman, Bert Dingley, Robert C. Wallace and William P. Nottingham.

Resigns Position

L. A. Shraeder resigned his position as exchange manager of the Wyoming office of the Illinois Commercial Telephone Co. in order to take over duties as manager of the Schuyler Telephone Co., Rushville, Ill.

Iowa State Rebuilds

Iowa State Telephone Co., Newton, began work in Greenfield routing the telephone cable in the city limits. Material is on the ground to start the work of completely rebuilding the telephone lines and plant, which were recently purchased from the Lincoln Mutual Telephone Company.

Remler Appointed Agent for

WAR ASSETS ADMINISTRATION

(Under Contract No. 59A-3-481

. . . to handle and sell a wide variety of

ELECTRONIC EQUIPMENT

released for civilian use

Write for Bulletin Z-1A

Remler Company Ltd., 2111 Bryant St. San Francisco 10, Calif.

REMLER

SINCE 1918

Radio *Communications* *Electronics*

"CRACK DOWN" AS YOU PLEASE . . . YOU'LL NEVER HURT YOUR ESTWING

• Crack down as hard as you please—an Estwing can take it and come back for more. Not only that, but they're built with just that delicate touch of balance needed to pack an added wallop into your swing.

Tough? You bet they are! It's the way they're made—the "I" beam construction with laminated leather handle—as shown in the illustration at left.

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1033 WEST VAN BUREN STREET · CHICAGO 7, ILLINOIS

Washington Reports

(Continued from page 33)

tinued deducting commissions at the old rate. The hotels contend that Bell of Pa.'s action constituted a tariff change without prior commission approval, while the telephone company alleges that the complaint is based on the theory that it has been making a division of rates, but that this applies only to public utilities.

FCC Commissioners

With Congress adjourned and the FCC apparently getting along all right with six Commissioners, one of Washington's favorite guessing games—"who do you think will get the FCC vacancy?"—may go into the discard until the first of next year. About the only reasonably certain aspect of the situation is that former Chairman Paul Porter will not return, now that OPA has been extended. President Truman, of course, could make a recess appointment, but with no strong candidate in the field, that does not appear probable. The most likely prospect, Montana State Unemployment Compensation Commission Chairman J. Burke Clements, probably was bumped out of the running when his political godfather, Senator Wheeler, was defeated in the state's Democratic primaries.

We Found it!

We represent many telephone companies who have found increased sales, profits, and satisfaction in their directory advertising.

Actual figures show that increases in the number of advertising accounts and the sales volume of as much as 100% in one of two issues are not uncommon for directories handled by the Loomis Advertising Company.

You too can rely on the 22 years experience and the record of $28,000,000 in advertising sales of the Loomis Advertising Company.

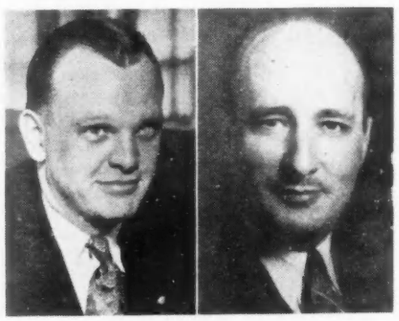
Wesley H. Loomis, Jr., President, and Roland T. Beard, Vice-President, Gettle Bldg., Ft. Wayne, Indiana, cordially invite your inquiry.

Loomis ADVERTISING COMPANY

502 Gettle Bldg., Ft. Wayne 2, Ind.
506 Olive St., St. Louis 1, Mo. 20 West 9th St. Bldg., Knsas City 6, Mo.
6908 Market St., Upper Darby (Phila.) Pa.; Omaha Nat'l Bank Bldg., Omaha 2, Neb.

American Coach Acquires Tower Division

Allen Greiner, president, and Howard Holan, executive vice president of the American Coach & Body Co., Cleveland, Ohio, announce the purchase of the inventories, designs, manufacturing licenses under patent, tools and machines of the Bird-White Tower division of the Bird-White Co., Chicago, Illinois. The Bird-White Tower, which up to now has been sold under exclusive sales agreement with American Coach & Body in the utility field alone, will be known as the American Tower Lift.



Howard Holan Allen Greiner

Operating out of Cleveland, the company's activities will extend to municipalities, transportation lines, and other related activities, and will feature a complete line of aerial equipment. American Coach & Body will manufacture and sell this product through its usual channels and in addition, anticipates using all of the existing Bird-White sales and service outlets.

American Tower Lift

✦

Title of the theme song for "The Telephone Hour," the Bell System's Monday evening radio program, is "The Bell Waltz," composed by Conductor Donald Voorhees of the Bell Telephone Orchestra.

Microwave Experimental Communication System

(Continued from page 37)

ability to sharply beam transmissions confining the energy to a very narrow path, it is feasible to operate a number of microwave communication circuits on the same frequency in the same geographical area even within line-of-sight of each other, providing sufficient angular separation exists between circuit paths so that two transmission beams are not directed into a single receiving antenna.

D. K. de Neuf

As indicated by Figure 2 the slotted parabolic microwave antenna is of physical size and shape which lends itself to convenient, economical, and simple mounting either from a standpoint of a permanent or temporary installation. Several of the Raytheon experimental transmitter-receiver units developed under the direction of J. Ernest Smith utilize a horn type of antenna affixed directly to the cabinet of the unit (see Figure 3). This type of equipment is especially adapted to portable use where the entire unit may be carried to the desired location and immediately placed in operation. The horn may be disconnected from these units when desired, and instead connected by conventional wave-guide and fittings to a parabolic type of antenna located on a roof-top or tower.

Figure 4 is an interior view photograph of a typical 50 watt fixed-station 4,000 mc transmitter showing its compactness, with the magnetron in the upper lefthand corner.

Periodic vs. Constant Sales Campaigns

There seem to be several schools of thought as to the value of periodic telephone service sales campaigns. In the opinion of your editor, a continuous sales effort is superior to the periodic campaigns in which telephone employees engage in all-out special sales efforts. If every employee will be constantly on the alert for prospects for telephone service, and will either refer these prospects to the commercial employees or, where feasible, close the deal directly, there will be little need for the high power (and sometimes expensive) selling campaigns.

It would seem that an employee would be more inclined to be constantly on the alert in locating new business if a suitable inducement was held out for all sales made. This could be in the form of small prizes awarded for a certain number of unit sales with possibly extra vacation time for high ranking salesmen in each exchange. Most employees prize highly extra time off in which they can take care of personal affairs. In the average organization this could generally be arranged without upsetting regular schedules.

Chemical Dehydrators

Automatically controlled, using flake calcium chloride for preventing dampness and condensation in totally enclosed automatic telephone exchanges, without heat or ventilation during any season of the year.

Type AA is used in community dial offices, requiring electric power for a 1/100th H. P. motor, continuous drainage for the waste solution of dissolved chemical and absorbed water vapor and servicing once a month.

Manufactured and sold by

The H. J. Kaufman Company

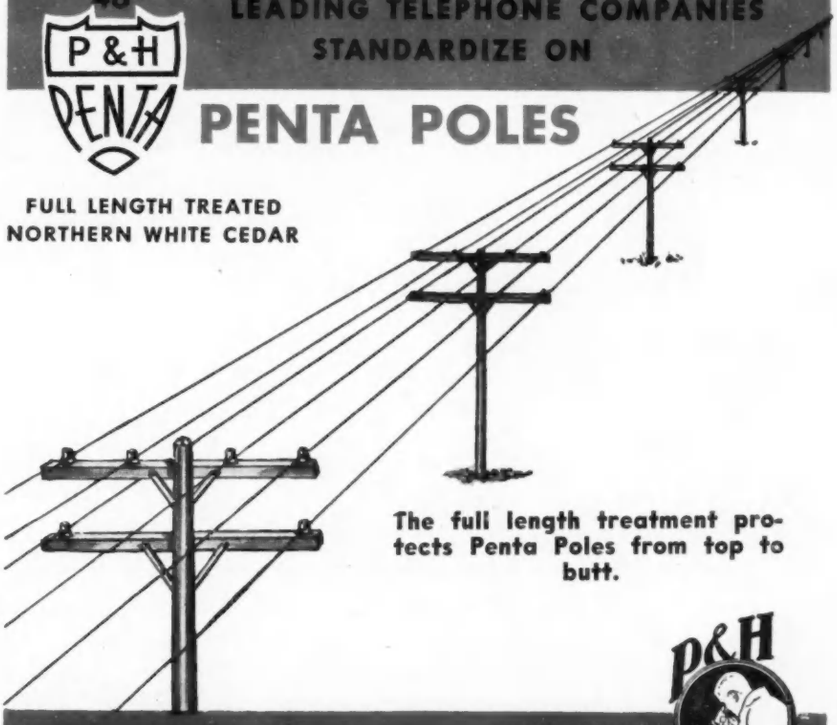
13215 Roselawn Avenue
DETROIT 4 MICHIGAN

'46 P&H PENTA

LEADING TELEPHONE COMPANIES STANDARDIZE ON

PENTA POLES

FULL LENGTH TREATED NORTHERN WHITE CEDAR



The full length treatment protects Penta Poles from top to butt.

PAGE AND HILL CO.

MINNEAPOLIS, MINNESOTA • 50 CHURCH STREET, NEW YORK, N. Y.

"STILL IN THE LEAD"

Distributed by AUTOMATIC ELECTRIC SALES CORPORATION STROMBERG CARLSON COMPANY

Slam The Door on pole upkeep!

It's What's Inside That Counts

When you choose Black Beauty poles to hold your lines, you'll find it is ***really*** a case of "Slamming The Door" on pole upkeep. The Texas "empty cell" creosoting method draws all moisture out of the wood and then fills each cell with high grade creosote, which keeps out termites, fungus, decay and other hazards that weaken and shorten the life of your poles. Each Black Beauty is tested for ample penetration before shipment, to guarantee long life.

Pole your lines with Black Beauties—completely armored against pests—and you can rest assured of added years of trouble-free service.

"BLACK BEAUTY" POLES
PRODUCT OF TEXAS CREOSOTING COMPANY

RECOMMENDED AND DISTRIBUTED BY

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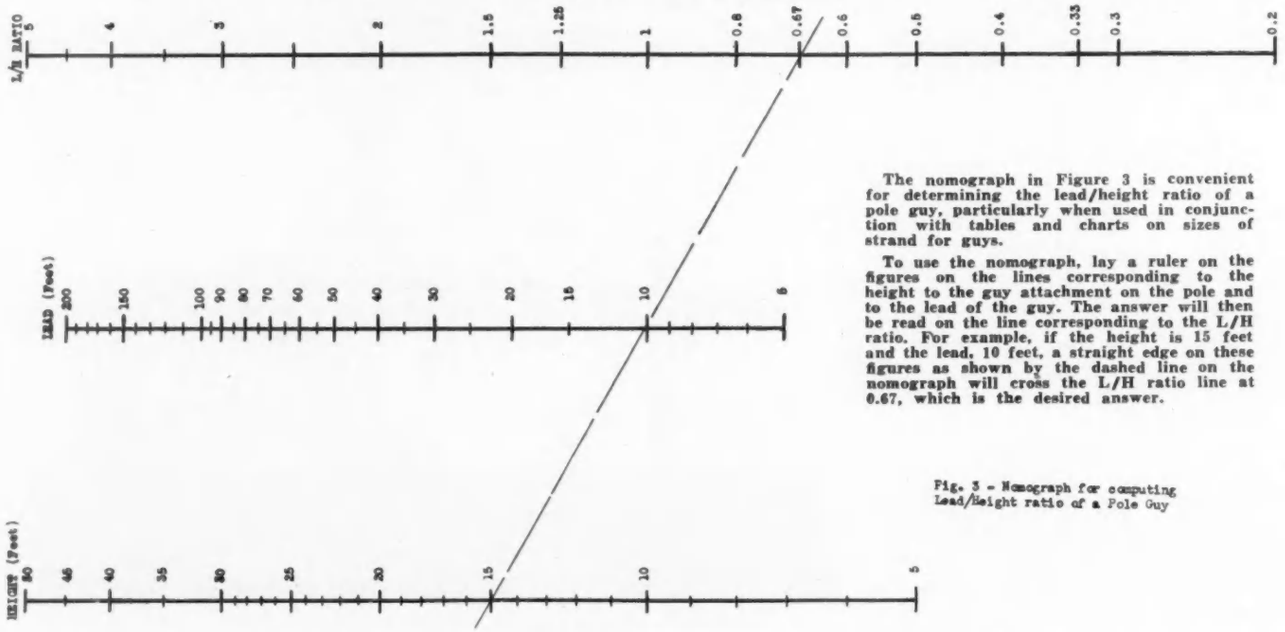
SALES CORPORATION

1033 WEST VAN BUREN STREET, CHICAGO 7, ILLINOIS

TELEPHONE ENGINEER Handbook Tables

POLE GUYING DATA (Continued) **Index—Pole Line Design** **Date—August 15, 1946**



The nomograph in Figure 3 is convenient for determining the lead/height ratio of a pole guy, particularly when used in conjunction with tables and charts on sizes of strand for guys.

To use the nomograph, lay a ruler on the figures on the lines corresponding to the height to the guy attachment on the pole and to the lead of the guy. The answer will then be read on the line corresponding to the L/H ratio. For example, if the height is 15 feet and the lead, 10 feet, a straight edge on these figures as shown by the dashed line on the nomograph will cross the L/H ratio line at 0.67, which is the desired answer.

Fig. 3 - Nomograph for computing Lead/Height ratio of a Pole Guy

Cordage Expands

Cordage, Incorporated, 6650 S. Cicero Av., Chicago, an affiliate of Kellogg Switchboard and Supply Co. of the same address, has purchased the factory buildings and residential property of Ajax-Consolidated Co. at 3512-3520 W. Carroll Ave., Chicago. The announcement of the purchase was made by C. D. Manning, president of Cordage, Inc.

The new acquisition gives Cordage about 30,000 sq. ft. of manufacturing space in a 3-story building and an adjoining 2-story building. These structures will permit the company to enlarge its manufacturing processes and to expand output to embrace the firm's substantial back-log of orders. The concern's previous manufacturing operations were confined to much smaller rented premises.

Cordage, Inc., makes a line of retractible, electrical rubber-jacketed cords for home and industrial appliances. These new extension cords are sold exclusively by Kellogg Switchboard and Supply Company under the trade names Kellogg "Koiled Kord", "Spirex" and "Flexelf."

Beginning with its retractible telephone cord, Cordage developed several applications for its product through use by the armed services during the war. Following V-J day, civilian types of this expanding and retracting cord have been placed on the market.

Aid in Rebuilding Jap Communications

General MacArthur's Civil Communications Section is to have the assistance of top-ranking executive, postal, research and communications specialists, including two Ohio telephone men, in rebuilding Japan's communication systems.

One is Archibald J. Allen, who recently retired as president of the Cincinnati and Suburban Bell Telephone Company. The other is Stuart K. Baker, division construction superintendent in Cleveland for the American Telephone and Telegraph Company.

Under the Potsdam declaration, Japan is permitted to maintain such industries, including communications, as will sustain her minimum economy, General Akin pointed out. General MacArthur's Civil Communications Section is responsible for bringing communications services up to a standard which will meet the requirements of the occupation forces and at the same time permit restoration of these services to meet the reasonable needs of the Japanese people in the most effective manner.

Japanese communications standards, so far as can be ascertained, have never been as high as those of the United States. When the war began the Japanese military took over all branches of the communications system and because of the demand of new equipment and requirements for military communications, permitted the civilian services to run down through the lack of maintenance and improved equipment. The bombing of Japan destroyed substantial portions of the communications facilities and industrial plants producing the necessary communication equipment. When the surrender came the communications systems were in a bad state.

Blind, Follows Tradition

Blind Irene Kemp, aged 35, called firemen from her special Braille switchboard while flames damaged the building in which she worked in Philadelphia. Miss Kemp's calls warned four other blind persons and 100 others who are physically handicapped, all of whom reached the street in safety.

Gilroy Stock Issue

Gilroy Telephone Company, Calif., has been authorized to issue $26,000 in stock by the Railroad Commission.

✦

Out of more than 98 million miles of Bell Telephone System wire less than five million is "open wire," the rest being in cable.

ALL the strength and durability inherent in steel are combined---with definite economies---in *Crapo* Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous *Crapo* Galvanizing Process, provide lasting protection against corrosion.

Ask the distributor of *Crapo* Galvanized Products near you or write direct for further information!

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA

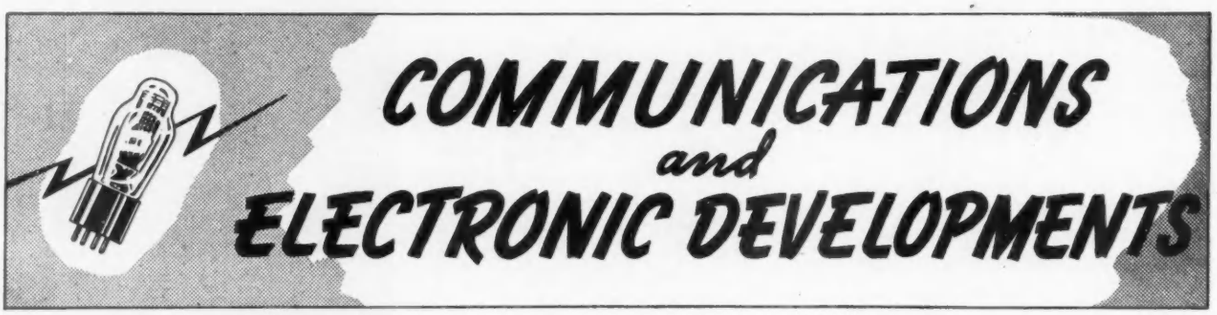
Save Time-Reduce Costs

by Using KEARNEY Solderless CON-NEC-TITES

Kearney Con-nec-tites provide a positive, permanent, solderless, high pressure contact. They give you economical and dependable connections. They are quickly and easily installed. Use them for connecting bridle to arm of open wire, for test points, dead ends, buck arm corners or in test pole connections. Available for all combinations of metallic conductors. Standardize on Kearney Con-nec-tites. For complete information and prices see your jobber — or write

JAMES R. KEARNEY CORPORATION
ST. LOUIS, MO.

JAMES R. KEARNEY CORPORATION
4236 CLAYTON AVE. • ST. LOUIS 10, MO.
Overhead and Underground Utility Equipment



Voice Transmission By Light Beam

A novel German-developed "Photophone," captured by allied troops in North Africa, provides for short distance voice communication over a beam of light, according to a U. S. Army Signal Corps report, now on sale by the Office of Technical Services, Department of Commerce.

The instrument, which resembles an oversized pair of binoculars mounted on a tripod, will transmit voices over a diffused light beam, or over an extremely narrow beam of white, red, or invisible infra-red light, according to the report.

The receiving component of the speech amplifier consists of a photoelectric cell followed by three resistance covered stages of amplification. The sending component uses a single stage of amplification between the microphone and a mechanical modulator which transmits the message over the light beam. Optical units to send and receive the light, a telescopic sight for focussing the beam, batteries, amplifier, earphones, and microphones are component parts of the equipment. Completely assembled, the equipment weighs about 50 pounds and may be carried by one man.

Used by the German Army for short distance communication, the "Photophone" was considered useful for communications across rivers, valleys, or rugged terrain where telephone wires could not be conveniently laid. Another advantage was that communications over the light beam could not be intercepted. Communication could be stopped, of course, by cutting the light beam.

Telephone Service to Trains

There has been a great deal of planning and considerable activity in making use of radio in the telephone field. A number of companies have already obtained licenses and are experimenting with both urban and highway radio telephone service to moving cars and trucks. But little has been said regarding the furnishing of long distance telephone service to moving trains. The railroad companies themselves have, of course, been extremely active in developing the use of radio for safety and dispatching purposes. These R.R. applications do not contemplate furnishing telephone service to train passengers but only as a means of private communication between the front and rear ends of a train and between train and control towers and stations.

Anyone that has much occasion to use the streamlined trains of today has no doubt, like the writer, felt the need for toll service on trains. Off hand, it would seem that if one or two individuals traveling in a truck or automobile on a main trunk highway could find enough use for long distance service to warrant the installation of expensive transmitting and receiving equipment, certainly important high speed railroad trains carrying upward of 500 passengers would have far greater need for such service.

Passengers on approaching their terminals would undoubtedly find radio-telephone service valuable in notifying friends or relatives of arrival time, making business appointments, etc. In our efforts to make telephone service truly universal, we should not overlook the need for service on railroad trains.

Radiophone Highway Service Extended

American Tel. & Tel. has a petition before the FCC for authority to erect short-wave transmitters along 800 miles of highway between New York, Washington and Buffalo; and between Los Angeles and San Diego on the west coast.

This latest application brings to nearly 1,400 miles the length of main arteries of the nation on which systems are either nearing completion or are in the application stage.

AT&T now has vehicular radiophone equipment installed and under test between Chicago and St. Louis and also between New York and Boston, and reports that these systems are nearly ready to operate. The last two named routes are expected to be ready for commercial use by late summer or fall, at which time a commercial license will be applied for from FCC.

Simultaneously, New York City is to see the start of a commercial vehicular radio-telephone extension service by late summer similar to that service which was introduced in the St. Louis area last spring. The New York City system would operate on a higher frequency than the intercity service.

Electro-Forming Wave Guides

Radio circuits involving microwave frequencies make use of *wave guides* rather than the usual wire conductor systems used at the lower frequencies. Wave guides are hollow rectangular tubes through which the radio waves pass. They present much lower losses to microwave frequencies than other types of wave transmission systems. A new process developed by the United States Rubber Company, known as *electro-forming*, permits the complex shaped wave guides to be built up by an electro deposition process. Silver or copper is deposited on a special matrix which can later be removed. The matrix is of a low fusing point metal that is easily melted out and later re-formed in a master mold.

Electro-form wave guides are free from the roughness and irregularities which result where the wave guide is made up of separate sections fitted together by soldering or other means.

"Speaking of shopping . . .

LISTEN TO THIS!"

"The things I find myself buying!...

"Enough paper clips in a year to fill a freight car... telephone poles by the hundreds of thousands... tons and tons and tons of paper for your telephone directories...

"You see, I'm the 'shopper' for the country's Bell Telephone companies. I'm a careful buyer . . . study markets all over the world... I get the best and know how to save by buying in large quantities from all sections of the country.

"That's one reason why our nation's telephone service is the world's most economical . . . as well as the world's best.

"I'm the *manufacturer* for the Bell System, too. I *distribute* the telephone apparatus I make, and all manner of supplies that I buy, to the telephone companies. To top it off, I *install* central office equipment.

"Remember my name . . .

"It's Western Electric."

MANUFACTURER... of 43,000 varieties of telephone apparatus.

PURCHASER... of supplies of all kinds for telephone companies.

DISTRIBUTOR... of telephone apparatus and supplies.

INSTALLER... of telephone central office equipment.

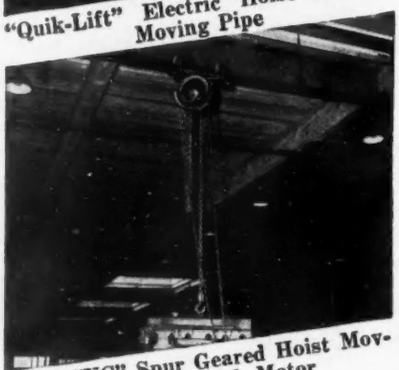
FOR THE BELL SYSTEM

Western Electric

Wherever COFFING HOISTS are installed there is a noticeable saving in manhours and manpower. New uses are being found daily in all kinds of plants and industry—whether it's production, construction or maintenance.

"Safety-Pull" Hoist Pulling Concrete Forms

"Quik-Lift" Electric Hoist speedily Moving Pipe



Model "YC" Spur Geared Hoist Moving Large Truck Motor

There is a COFFING HOIST to meet your requirements. Contact your supply house for detailed information or write for our Bulletin Form 4.

COFFING HOIST COMPANY
Danville, Illinois, U. S. A.

Electronics Exhibit

An exhibit of more than 300 items of German and Japanese electronic and communication equipment will be open to the public from August 5 through 30 in the main lobby of the Commerce Building, 14th Street near Constitution Avenue, Washington, D. C. The display has been arranged by the Technical Industrial Intelligence Division of the Department's Office of Technical Services, in cooperation with the U. S. Army Signal Corps and the Naval Research Laboratories.

A "photophone," captured from the Afrika Korps of the German Army, will be in operation. This device, designed for communication across rivers and valleys, permitted German troops to talk over a narrow beam of infrared light. Conversation over the beam could not be detected or intercepted, although it could be disrupted by smoke or fog.

Included in the exhibit will be a German radar set of the type used on submarines and aircraft for searching operations.

German apparatus for locating enemy positions at night by means of a diffused beam of infrared light also will be on display. Since the beam is completely invisible to the naked eye, objects illuminated with infrared light can be seen only through a viewing device.

Over 200 types of German and Japanese electronic tubes will be exhibited. They include cathode ray tubes, metal ceramic triodes, centimeter magnetrons, and the pentode amplifier RV-12P-2000, which was standard in German military equipment.

Among the 100-odd different items of communication equipment on display will be radio receivers and transmitters ranging from very high to very low frequencies, 72 kilocycles to 800 megacycles.

Several examples of the German magnesium die-cast radio chassis are another feature of the exhibit. In America, chassis of this type are made by stamping and soldering the parts. The Germans have developed a casting machine with which the chassis can be moulded in one piece with great precision and uniformity. The machine can turn out chassis at the rate of 80 an hour.

A large collection of Zeiss optical lenses will be included in the display.

According to Edwin Y. Webb, Jr., chief of the Electronics and Communications Unit, TIID, this equipment was assembled to permit its examination by electronics and communications firms in this country. Arrangements can be made through Mr. Webb for companies to study and test the items on display. Reports on such tests will be made public through the Office of Technical Services.

Foreign Radio Link Tolls on 50-50 Basis

The FCC cleared its agenda of two proceedings July 11, ordering the formal termination and dismissal of the inquiry into the free delivery practices of international carriers and the proceedings relating to the division of the radio-link portion of tolls for foreign radio communications on a 50-50 basis.

In dismissing the free delivery inquiry, which was launched when the Commission suspended revised tariff schedules of the Mackay Radio & Telegraph Co., and later broadened into a study of the free delivery practices of all international carriers, the FCC order pointed out that revised tariff schedules have been filed by all the companies establishing rules under authority of the special permission granted June 13.

Terminating the radio-link tolls division proceeding, the Commission stated that the equal split has been effected between U. S. and all British Commonwealth points by the Bermuda Telecommunications Agreement. It added that the uniformity of terminal and transit charges necessary to equal division of tolls can best be promoted by inter-governmental agreements, and that formulation of such arrangements is under study.

Consider Neighbors on That Party-Line

An "inquiring reporter" for a Mid-West newspaper asked several persons, including two housewives, whether conversations on party-line telephones should be limited in length as a matter of consideration for others who might be waiting to use the line.

The question was raised, not only because of the neighborly elements involved, but because instances had been reported of party-line users refusing to hang up when asked to do so in emergencies.

The persons interviewed favored reasonably brief conversations. Both housewives expressed the opinion that ten minutes was the longest time necessary for any conversation. Their comments, summarized, were: "In ten minutes I can say all I want to. If I want to talk longer I should try to see the person. If someone has an emergency call, the one using the line should hang up at once."

Line Call Amplifier

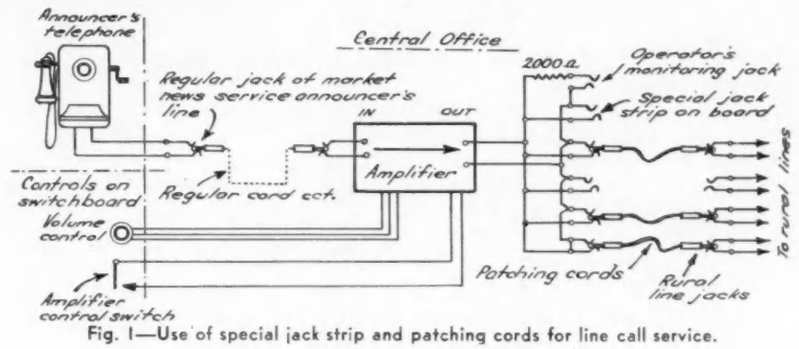


Fig. 1—Use of special jack strip and patching cords for line call service.

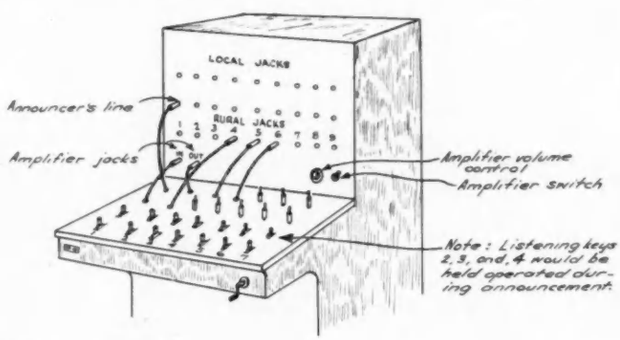

LOCAL JACKS
Announcer's line
RURAL JACKS
1 2 3 4 5 6 7 8 9
Amplifier jacks
IN OUT
Amplifier volume control
Amplifier switch
Note: Listening keys 2, 3, and 4 would be held operated during announcement.

Fig. 2 — Use of regular cords for line call service.

Many Independent companies offer call service to its patrons. This service is usually rendered at a cost of ten to twenty-five cents per line and consists in the operator "plugging up" four or five lines at a time and making the line call announcement with all her listening keys open on these cords. In some cases the announcement is made from a subscriber's telephone. Because of the number of connected telephones involved when several lines are plugged together, the transmission is usually very poor. This has been overcome by the use of "line call amplifiers". These are simply one or two tube amplifiers which are inserted in series with the operator's or talking subscribers' circuit so as to boost the voice level to a value sufficient to properly serve all connected telephones.

These amplifiers can be connected in the circuit by terminating them on a special jack strip which is used with patching cords for establishing the connections as shown in Fig. 1.

Another method consists in terminating the amplifier on two special jacks and using regular cords with the listening keys held open during the announcement (see Fig. 2).

✦

Bell Telephone Laboratories has more than 7,200 persons on its payroll, an increase of nearly 50 percent since Pearl Harbor.

JUST ARRIVED

A new postwar stock of switchboard plugs with all-molded insulation has just been received from Denmark. These are the famous plugs we sold you before the war.

We have a good stock of the following:

3-Conductor Plugs:
Styled after Kellogg No. 106
Styled after W. E. No. 109

2-Conductor Plugs:
Styled after W. E. No. 47-A
Styled after Kellogg No. 42

Priced Right

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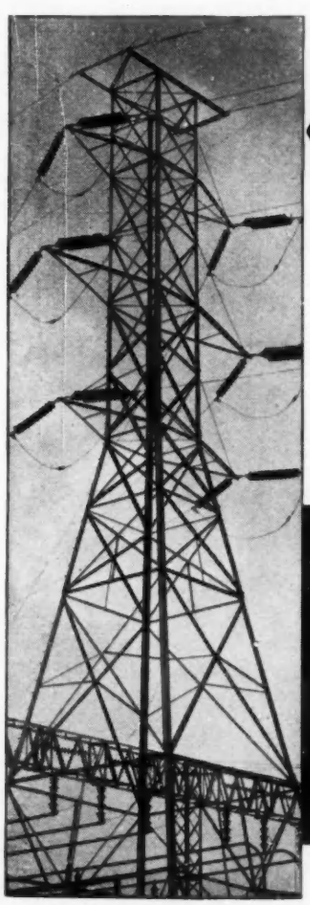
SUTTLE EQUIPMENT CO.
Lawrenceville, Illinois

DEPEND ON
SUTTLE



DILLON DYNAMOMETER

A multitude of Dillon Dynamometers are protecting communities and companies alike from failures caused by wires going down in severe storms. Standard for dependable accuracy, simplicity and convenience. Actual size 8¼" x 6¼" x 3". In wide use also in telephone and telegraph work for indication of tension in guy strands, messenger and wire. Many other uses where torque, weight, and overload are vital factors. Take out guesswork of "sight and sag". Hooked on in a jiffy, indicates tensions in seconds. Direct reading. Nine capacities, 500 to 20,000 lbs. There's a place for the Dillon in every Electrical Plant.

Send for illustrated Dynamometer Manual.

W. C. Dillon & Co., Inc.
5410 W. HARRISON ST. CHICAGO 44, ILL.

Use of Chemical Dehydraters For Telephone Offices

Moisture and telephone equipment make poor companions. Moisture will condense on telephone equipment when the dew point temperature of the air exceeds the temperature of the equipment. Condensation is most likely to occur during periods of high humidity and where there is a rapid fluctuation in temperature.

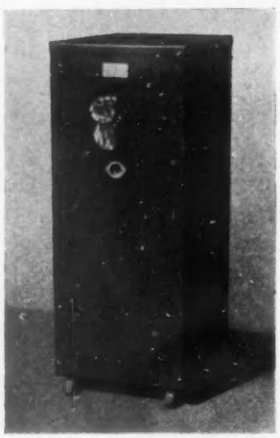


Fig. 1—Typical dehydrator suitable for telephone office use.

Condensation can be readily controlled by maintaining the proper room temperature and also by the use of chemical dehydraters.

Chemical dehydration of the air is accomplished by the use of a dehydrating chemical which absorbs moisture from the air and converts it into a solution which is drained away into the sewer. In some dehydraters the dehydrating chemical merely holds the moisture up to the limit of its capacity and it then must be replenished, no drain to the sewer being necessary. The unit shown is provided with an adjustable humidistat which automatically starts and stops the motor driven fan thus regulating the volume of air that is drawn through the dehydrater. This type of unit is particularly well suited for unattended offices where the building is kept tightly closed.

A dial office having a volume of approximately 4000 cubic feet would require chemical and electrical current, costing about three dollars per year. The cost of a dehydrater of this size is about $100.00. Table No. 1 illustrates specifications for one particular make of dehydrater.

TYPE	CABINET SIZES	HOPPER STORAGE	BUILDING VOLUME	MOTOR H. P.
A	16" x 24" x 41"	35 lbs.	20,000 cu. ft.	1/100th
B	20" x 36" x 42"	65 "	50,000 " "	1/ 30th
C	24" x 36" x 44"	110 "	90,000 " "	1/ 25th
D	34" x 46" x 44"	200 "	175,000 " "	2-1/ 25th

"By gosh, if I can't get a telephone one way, I'll get it another!"

STROMBERG CA

Replace Operator's Batteries with long life

electrox battery eliminator

Type PA-05004

Plugged into your light circuit, the PA-05004 will deliver a constant, humless direct current to the operator's circuit on magneto switchboard. In case of power failure, Power-off Relay automatically transfers operator's circuit to stand-by dry cells.

Other Electrox models are available for Lamp Signal (PBX), and Automatic (PAX) Systems. Capacities of 0.5 to 6 amps, from 12 to 48 volts.

MADE BY THE
ELECTROX DIVISION, SCHAUER MACHINE CO.

STROMBERG

BRANCH OFFICES: CHICAGO 6, KANSAS

G. CARLSON Recommends

the sturgis standard

featuring comfort plus economy!

An operator's chair is a mighty important part of her life—and a comfortable chair pays dividends in higher efficiency and better tempers.

The Sturgis Standard, favorite with operators, is not only comfortable . . . it's highly economical in terms of long service and low maintenance cost.

This chair features a frame of heavy welded steel tubing, 1″ thick for the base and ¾″ thick for the circular footrest. Seat and back are of curled hair, covered with genuine brown leather. The seat measures 16½″ in width, 14½″ in depth; the curved back is 8″ high, 13″ wide.

Chair Height Specifications

Seat Height Adjustment	Footrest Height from Floor	Seat Height Adjustment	Footrest Height from Floor
18″ to 22″	5″	24″ to 28″	10″
20″ to 24″	6″	26″ to 30″	12″
22″ to 26″	8″	28″ to 32″	13″

DISTRIBUTED EXCLUSIVELY BY **STROMBERG-CARLSON**

sturgis low chairs

your best investment in comfort... plus low maintenance!

The Sturgis Low Chair is designed especially to meet the requirements of chief operators, information operators, etc.

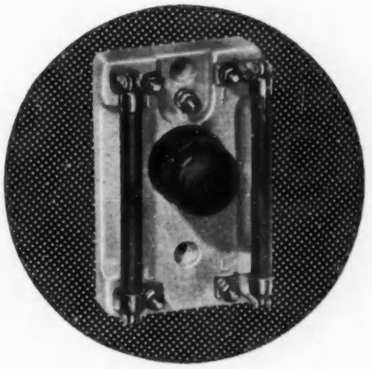
Long-wearing, low maintenance features include a frame of 1″ steel tubing, smoothly welded at all joints. The full saddle seat and back may be ordered in either genuine or imitation leather upholstery, with padding of long-wearing, comfortable curled hair. The back is plaited and curved to assure posture-fitting comfort. Seat measures 15¼″ x 16¾″.

The seat height of the No. 876-A Sturgis may be raised or lowered from 17 to 21 inches, and the back can be easily and quickly adjusted without tools or special keys.

DISTRIBUTED EXCLUSIVELY BY **STROMBERG-CARLSON**

individual station protector

reliable 955A



MFD. BY RELIABLE ELECTRIC COMPANY

- One-piece Design
- Simplified Mounting
- Asbestos Mats Eliminated

The very simplicity of the Reliable 955A is assurance of long, trouble-free service. Fuses are mounted on a one-piece, low absorption porcelain well spaced for convenient connecting. Reliable Self-cleaning Sawtooth Discharge Blocks are standard, dissipating static without time lag or danger of grounding the line. The 955A uses No. 77 seven ampere fuses —other fuse capacities can be furnished.

"Reliable Identifies the Quality"

RG CARLSON FACTORY, GENERAL OFFICES: ROCHESTER 3, N. Y.

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STROMBERG Telephone CARLSON

WHAT FOR? WHAT'S NEW? WHO MAKES IT? NEW PRODUCTS AND APPLICATIONS WHEN AVAILABLE? WHERE FROM?

Soil Resistivity Meter

Applicable to the telephone industry, where construction and equipment extends into or runs underground, is the Associated Research Soil Resistivity Meter Model 243 for quick, easy and accurate reading of electrical resistivity of soils. Damage and destruction wrought by electrolysis and corrosion from soil currents, mount into large figures, and protection founded on positive readings of resistivity can prevent much of this. The meter measures ohms total resistance, but is calibrated to read units of ohms per cubic centimeter. Full scale reading is 30,000 ohms per cubic centimeter, and the reading is within radius of approximately 12 inches of tip of probe, which can be inserted to any desired level.

Cranking is eliminated by self contained power source, and potential is 3 volts obtained from 2 No. 6 dry cells. With push button control, battery is in use only while readings are being taken. A comfortable webbed strapping harness is supplied, and the meter is housed in a lightweight weather-proof metal case. Shipping weight; 19 lbs. For further information, mail a postal to this department.

Stainless Steel Strand Folder

The attractive new folder put out by Page Steel and Wire Division of American Chain and Cable Co., Inc., Monessen, Pa., is now available, giving information on their Stainless Steel Strand, with outdoor photographs and close-ups showing Stainless strand in use together with informative data and useful tables.

Page Stainless Steel Strand, in addition to its well known corrosion and fatigue resisting properties, offers higher strength per pound of line, and is preformed, which insures uniform stranding and higher overall breaking strength. Advantages mentioned in the folder include high heat resistance, low tension loading on towers, abrasion, resistance, and no electrolytic action with standard fittings.

To obtain this folder, mail a postcard to your New Products editor, Telephone Engineer Publishing Corporation, 7720 Sheridan Road, Chicago 26, Illinois.

New Ward Leonard Bulletin

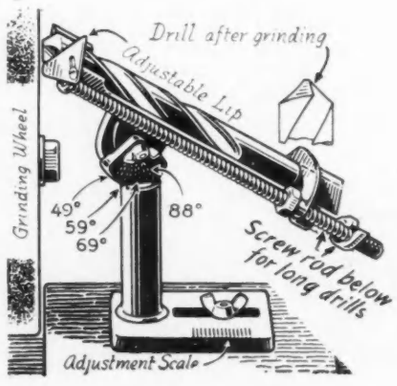
Ward Leonard Electric Co., Mt. Vernon, N. Y. has put out a new booklet—No. 104—about their Midget Metal Base Relays, which are designed for use in small radio transmitters, aircraft control circuits and applications where space is limited. This fully illustrated bulletin includes coil and contact data, contact arrangement diagrams, dimension sketches of front and rear mounted units and enclosing cover data for both standard and heavy duty relays.

Booklet No. 104 can be obtained free of charge by mailing a postal to New Products Editor, Telephone Engineer Publishing Corporation, Chicago 26, Ill.

Improved Grinding Attachment

The improved Super Drill grinding attachment, a product of A. D. McBurney Manufacturing Company, is now available at $2.95. The illustration shows how to set up the Super attachment for bottom drills and routers, plastics, wood and soft materials.

Further information may be obtained from the New Products Editor, Telephone Engineer Publishing Corp., 7720 Sheridan Rd., Chicago 26, Ill.



FTR 9-A-1 CARRIER TELEPHONE SYSTEM

An ADDITIONAL TELEPHONE CHANNEL

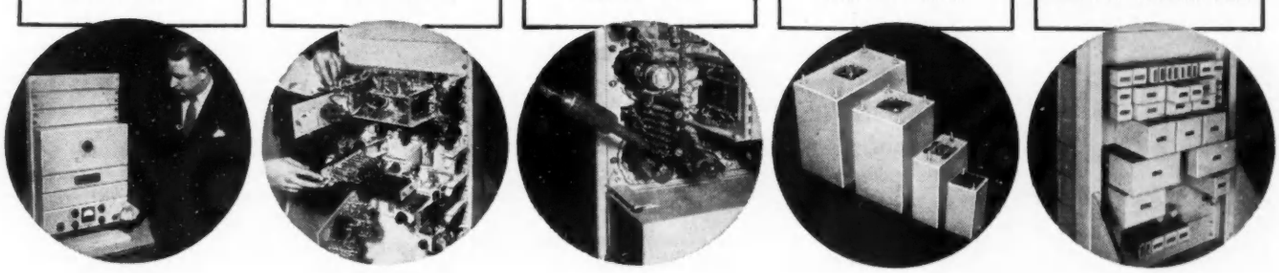
OVER EXISTING OPEN-WIRE LINES AND CABLES

Telephone companies, railroads, power, oil, pipe-line and other companies having privately-owned communication lines will find the FTR 9-A-1 Carrier Telephone System indispensable for additional telecommunication facilities... permanent or temporary... without need of outside plant expenditures.

This Single Channel Carrier Telephone System provides high-grade communication over 300 miles... with intermediate repeaters it is applicable on lines 1,000 miles or more, depending on the gauge of open wire conductors, length of intermediate cables and number of bridged stations. The FTR 9-A-1 features interchangeable terminals, two or four wire termination, built-in ringer. Write to Dept. H 49 for complete details.

Available Now!

COMPACTNESS | **ACCESSIBILITY** | **FLEXIBILITY** | **SEALED UNITS** | **EASILY INSTALLED**



Federal Telephone and Radio Corporation

In Canada:—Federal Electric Manufacturing Company, Ltd., Montreal
Export Distributor:—International Standard Electric Corporation

An IT&T Associate — FTR — Federal Telephone & Radio

Newark 1, New Jersey

One Man Pulls Cables—Takes Up Slack
No. 324 Simplex Wire Tensioning Jack: 2-tons capacity, 20¼" take-up with every grip. Weighs only 13 lbs.
Exerts a powerful straight line pull, making it easy and safe for one man to pull overhead and underground cables, or take up the slack in guy, trolley and transport wires. Quickly hitched, using standard wire grips and slings. Lever has safety clip—cannot fall out. Write for Catalog No. 45.
Simplex
LEVER SCREW - HYDRAULIC
Jacks
Templeton, Kenly & Co.
Chicago (44), Illinois
Better, Safer Jacks Since 1899

Line and Desk

(Continued from page 46)

size for a particular person, measure along the inside of his leg from the shoe arch to within ½ inch of the projecting knee bone.

Q. Please give me a suitable method of forming an eye in the end of a winch rope.

A. The method of forming a winch rope eye illustrated in Figure 2 will make an eye as strong as the rope itself. The end of the rope is first trimmed to remove frayed strands. The strands are then separated into two parts each about 20 inches long. A simple knot is then tied in the divided end of the rope and the ends passed in and around the resulting loop. The two parts of the rope will fit smoothly in the spiral grooves resulting from the original separation of the rope end, producing a neatly formed eye. Before serving the neck of the eye with the No. 14 wire, compress the eye slightly to form an elongated loop about 8 inches long.

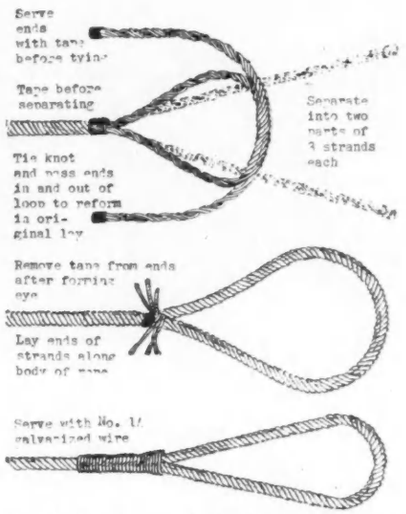

Serve ends with tape before tying
Tape before separating
Separate into two parts of 3 strands each
Tie knot and pass ends in and out of loop to reform in original lay
Remove tape from ends after forming eye
Lay ends of strands along body of rope
Serve with No. 14 galvanized wire

Fig. 2—Showing method of forming eye in end of winch rope.

Q. How should a pole be set in a sloping bank?

A. When a full length treated pole is set in a slope, the hole must be made deeper to compensate for the loss of holding power of the pole in the earth due to the slope. A rough rule for determining the additional depth is to dig the hole to the normal depth for a pole on level land, then insert a stick horizontally in the upper edge of the hole and measure the distance between the stick and the lower edge of the hole. Dig the hole to the additional depth represented by this measurement. For butt-treated poles, where additional depth beyond the normal point would result in the wood above the treated butt coming in contact with the earth, excavate the earth around the pole as illustrated in Figure 3. When this is done, it will not be necessary to measure for the additional depth of the hole to be dug.

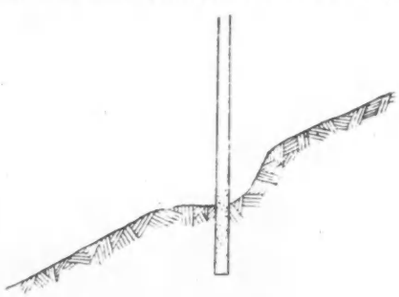
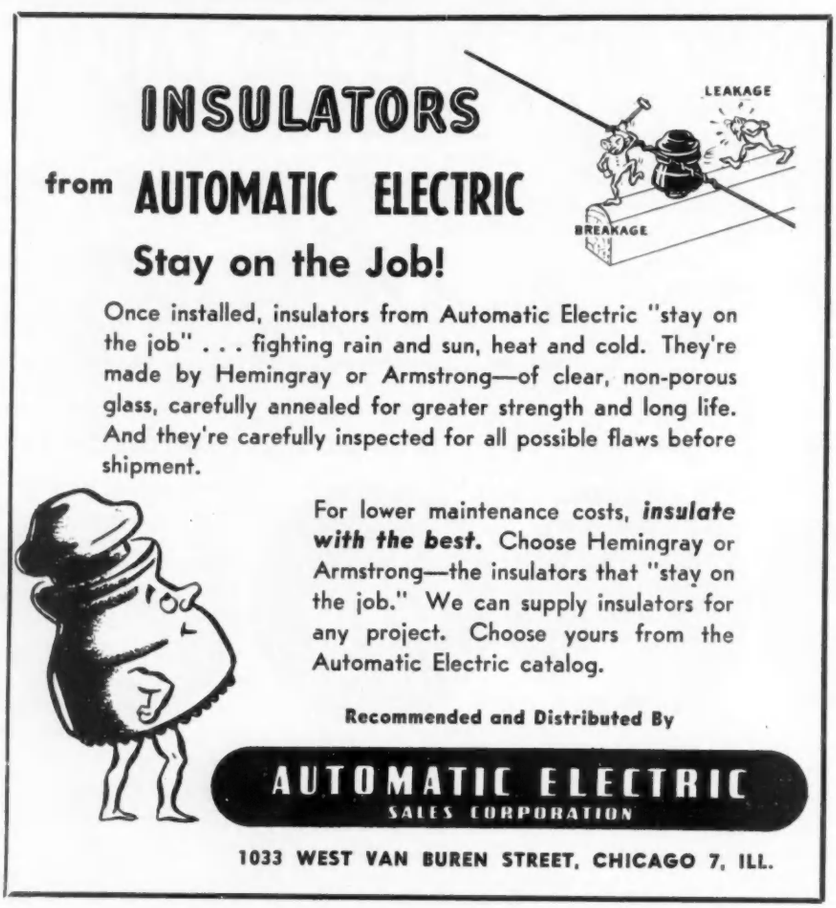


Figure 3 — Excavating earth around butt-treated pole to keep earth from coming in contact with wood above butt-treated portion.

Q. What are the comparative merits of the piano wire and cable saw methods of splitting lead sleeves in cable splicing work?

A. The method using piano wire for splitting lead sleeves is claimed to be safer, faster and cleaner than the one in which a cable saw is used to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cut a lengthwise slit in the sleeve. However, a cable saw is satisfactory if the work is carefully done. Be sure to place the sleeve on a firm support when using the saw.

Q. Please give us a diagram showing how a two-wire bracket lead using long span construction should be transposed. The standard method of transposing the lead that uses two brackets on the same side of the pole adjacent to the transposition pole and a bracket on opposite sides of the transposition pole is not satisfactory for long spans.

A. A diagram illustrating a suitable method of transposing a two-wire bracket lead with long spans is shown in Figure 4. When this method is employed, there is less danger of the wire swinging together than in the case of the lead transposed in the usual manner for short spans of ordinary iron wire.

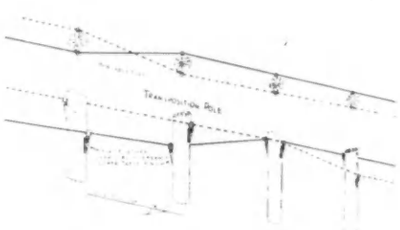

Fig. 4—Transposing a two-wire bracket lead of long span construction.

Indiana Commission Overflowing With Utility Cases

The Indiana Public Service Commission has many telephone cases before it for decision at this time causing some delay in new cases being filed. Pending cases on which no hearing dates have been set include six petitions for increased rates, eleven for improvements in service and three for authority to issue securities, according to W. H. Beck, secretary of the Indiana Telephone Association.

On August 6 a hearing was scheduled by the Commission on a rate increase requested by the Arlington Telephone Company and on August 1 the subscribers petition for better service from the Farmers Mutual Telephone Company of Cross Plains was heard at Versailles. During July the Commission heard a number of cases including one which granted the request of the Eastern Indiana Telephone Co. for authority to purchase the Advance Telephone Co.—a rural line company which operated in the area adjacent to Winchester.

Present petitions before the Commission for increased rates include the Home Telephone Co., Inc. of Waldron; Bloomington Home Telephone Co.; Hendricks County Telephone Co. of Clayton, and Sweetzer Rural Telephone Co. Another case is the rate increase petition of the Fountain Creek Telephone Co. of Covington which includes request to issue securities and to abandon exchanges at Foster and Stone Bluff.

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Individuals differ greatly in their ability to understand radio or telephone messages in the presence of noise, according to a report now on sale by the Office of Technical Services, Department of Commerce.

The report, prepared by researchers at the Psycho-Acoustic Laboratory, Harvard University, describes the development of three tests to assist the armed forces in selecting efficient operators in vital communications centers. The investigators had found that ordinary medical tests for hearing—the audiometer, whisper, or watch-tick tests—were not helpful in determining "ability to listen in noise."

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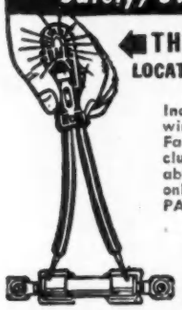

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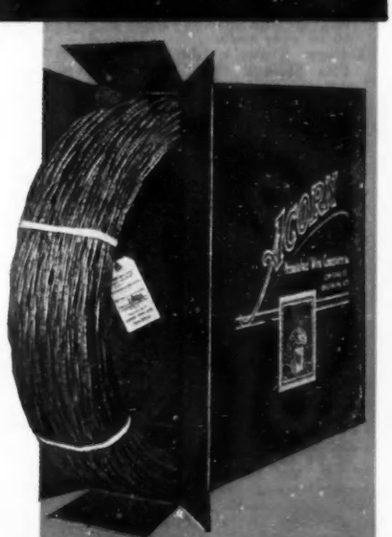

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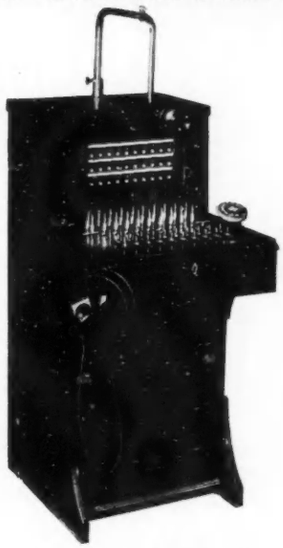

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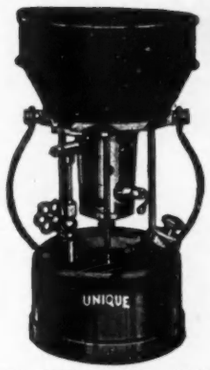

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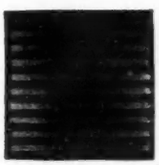

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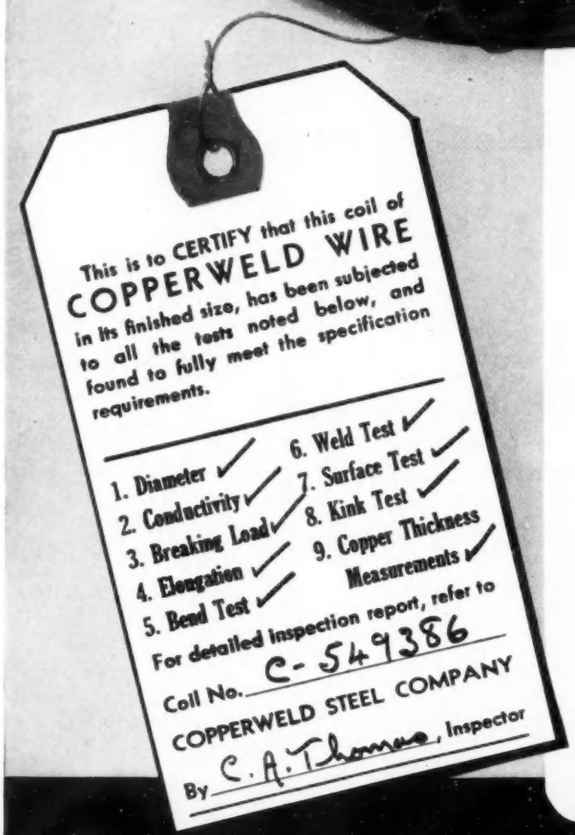
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